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IN THIS ISSUE

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Maxillofacial Surgery and Hypnosis in the Emergency and the Operating Room

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MAXILLOFACIAL SURGERY

The practitioner of the healing arts is constantly confronted with the question—"What are the indications for the surgical interference in Maxillofacial Trauma?" The answer is resolved within the framework of the concept: Restoration of function and restoration of cosmetic contour by re-establishing anatomical continuity.

Our homes, our public facilities, our industries and transportation facilities, in the order given, are the four causes of the staggering total of 9,200,000 annual accidents in U.S.A.

The advancement in chemotherapy and antibiotics has extended the surgical approach in a field of constant contamination—the oral cavity—site of multiple compounded and comminuted fractures of the facial bones.

HYPNOSIS IN EMERGENCY AND OPERATING ROOMS

Interest in hypnosis has appeared on the medical horizons in practically every generation, followed by a sudden decline of interest because of the too great expectation on the part of the clinician and the public at large. We are at that peak of interest in medical hypnosis again. The decline is soon to follow because hypnosis is being oversold by professionals and non-professionals alike.

ACCIDENTS IN U. S. — 1958[1]

Work	1,800,000
Motor Vehicle	1,350,000
Home	4,000,000
Public	2,050,000
Total	9,200,000

11% (1,010,000), Injuries Above Neck.

ACCIDENT TOTALS — 1958[1]

Accidental Deaths	91,000
Motor Vehicle Deaths	37,000
Permanent Impairment	340,000
Temporary Total Disability	8,750,000
Cost of Accidents	$12,050,000,000.
Cost of Medical Care	$ 950,000,000.

Eleven per cent (11%) of all accidents and 65%[2] of all automobile accidents result in head and face injuries, requiring surgical attention.

And yet, those physicians or those practitioners of the healing arts, who recognize the doctor-patient relationship as a psychological phenomenon.

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will continue to utilize the by-product of this phenomenon—patient's state of altered behavior—in which he becomes less critical and responds often more favorably to the euphorically suggested therapy. Physicians are realizing that in this altered state of behavior, the patient is susceptible to all forms of suggestions—implied or expressed[3]. Such altered behavior—a trance state—is a part of each of us, physicians, psychologists, dentists, nurses and the public at large.

For example, you may recall some of your own personal experiences, at a time when you were totally engrossed with your favorite hobby, sport, avocation, or distressed about the health of your loved ones. On such occasions, any accidental trauma to yourself escaped your attention. You were not aware of the existing injury. In due time, you discovered some blood on your clothing, hands, or on your equipment. When you investigated the source of bleeding, to your amazement, you discovered that the blood was your own. Soon you located the site of injury. Up to then you were not aware of the existing injury, nor of the time of the trauma. You felt no pain at the time of the injury. Your peripheral neurological sensory net-work failed you in some way. Your pre-occupation, or your stress, up to that time, had a priority over the ability to perceive pain. You delegated the warning of your sensory net-work to a lower level of priority. You personally modified or completely altered your normal reaction to this noxious stimulus—the trauma.

Psychologically speaking you altered your normal reaction or behavior[4]. Neurologically speaking—such a painless injury was an unique, baffling and amazing experience.

On such occasions, you chose to manipulate your own attention to satisfy your own—then existing emotional, avocational and health needs. Such manipulation of personal attention has been often referred to as auto-hypnosis or self-induced trance. On the other hand, when you allow someone else to manipulate your attention, and you respond physiologically to the suggestions so made, you are said to be in heterogenous trance state—or hypnosis.

RESPONSE TO SUGGESTION

Every practitioner of the healing arts is utilizing the modality of response to suggestion. This phenomenon of response is ône of the patient's own attributes.

The patient's response to a logically presented and emotionally loaded suggestion, satisfying his own health and emotional needs and interests, is medically one of the most useful physio-psychological phenomena.

In the practice of the healing arts, suggestion has a synergistic effect, especially when the patient has been conditioned as to what to expect from a prescribed medication or therapy. The art of suggestion and establishing rapport are integral components of the practice of medicine.

Suggestion is the basis for the great assortment of placebos and patent medicines.

Suggestion is acceptable to the patient when it is within the scope of his semantics, and when it appeals to his health and emotional needs, and when he is en rapport with the physician.

Suggestion timely and properly utilized in a well-motivated and responsive patient is the basis for all hypnotic phenomena—from induction to post-hypnotic response. This phenomenon is self-induced. The physi-

cian only aids the patient in maintaining or re-establishing the phenomenon. Such assistance and instruction are more effective on a permissive basis. It is a common practice to induce hypnosis under the guise of teaching relaxation.

When does suggestion end and hypnosis begin?

Some students of hypnosis are beginning to entertain the concept that the transition from suggestion to hypnosis is only a matter of degree in response. The transition is affected by the psychological dictates of numerous factors, such as environmental stress and trauma, motivation, suggestibility, the patient's need to maintain awareness in the area of his special interest, and many other factors.

Success in the practice of the healing arts requires that we look at the patient as a unit, as a total organism, responding to the stress of the physical and the psychic trauma of everyday life. Often, suggestions made by the physician can, in part, modify the patient's response immediately.

DEFINITION

The very moment the physician recognizes his patient as an individual and exhibits personal and sympathetic interest in the patient's life situation and need, the patient becomes therapeutically pliable. The patient is open to suggestion, or in other words, he becomes easily suggestible and easily conditioned to elicit some motor, sensory or intellectual responses consistent with and in the interest of his health problem.

The main objective in the treatment of a patient then becomes a *problem of the organization of patient's behavior as therapeutically indicated,* by the proper utilization of the phenomenon of response to suggestion. *Such organization of behavior and utilization of response* are often referred to as medical hypnosis.

How to recognize and how to determine the patient's susceptibility to suggestion (suggestibility) has been the stumbling block in the proper application of therapeutic suggestion. A practical therapeutic rule to follow is to consider that every patient is anticipating the euphoric type of suggestion. Psychologists and psychiatrists, with their respective vocabularies, have expended much effort in their attempts to define the term hypnosis, or trance state.

Every definition eventually gravitates to the descriptive phase of the psycho-physiological phenomena elicited by individuals considered to be in hypnotic trance. Every definition eventually condescends to the concept that the trance state is a self-induced, and a heterogenously or self-maintained psychological process. In our daily activities, all of us demonstrate the trance state in various stages and durations.

Now it is an accepted concept that every patient who is confronted with a health problem (organic insult, emotional or environmental stress), which calls for a consultation with a practitioner of the healing arts, has already modified his usual psychological behavior, or has already responded in his own way to this newly created stress situation.

Many of the traumatic patients confronted with an emergency surgical procedure have altered their psychological behavior, or expressing it differently, have entered a trance state of their own making. Some of these patients do not suffer the acute pain commensurable with the degree of trauma. This phase of the phe-

nomenon of altered pain perception is referred to as hypno-anaesthesia. Hypnosis and hypno-anaesthesia are now being discussed by many text books on pain. It is a recognized fact now that anaesthesia in varying degrees can be elicited by the various forms of suggestions.

Stress situations often minimize pain, while anxiety situations invariably exaggerate it. Our social structure has developed in all of us a heightened sense of defense. The higher the civilization—the higher this sense of defense—the higher the level of consciousness. But every patient confronted with pain or stress of some magnitude, has allowed the immediate environment to alter his basic behavior. He has lowered, or in some cases, has completely given up his defenses—one of them being "pain perception". He is in close relationship with his environment. If this relationship occupies his attention to the exclusion of everything else, he is said to be in hypnotic relationship with himself, or to be in auto-hypnosis.

The existence of this environmental hypnotic relationship should be recognized the first time the patient presents himself to the practitioner of the healing arts. The interested and the understanding physician, or dentist, who looks at the patient as a whole organism—organically and emotionally functioning, can more easily break through the temporary psychological barrier of environmental relationship. The newly created doctor-patient relationship should be only a modified continuation of the patient's already existing hypnotic relationship.

PAIN

The paramount objective of anaesthesiology is to relieve pain and suffering.

Pain, and pain alone, organic or psycho-somatic, brings the patient to the practitioner of the healing arts. The physician, the surgeon, the dentist, and the anaesthetists are aware of the pain differential in the various patients and in the various pathological conditions.

Pain has been one of medicine's major concerns since the dawn of civilization. Man has searched far and wide for the magic drug or method of treatment to relieve pain. Morphine and the anaesthetic agents are examples of such efforts.

The old concept of "magic" in relieving pain by one method or another, still lingers on in the present day practice of the healing arts. Hypnosis and hypno-anaesthesia have often been credited with some of that magic.

Throughout the ages interest in pain, in all its facets, has infiltrated the various disciplines of the healing arts. Some of them have attempted to locate the center of pain, others—the perception of pain, patient's reaction to pain and its control.

1. **Anatomically**—Pain is said to be a localized sensation, having various degrees of intensity, duration and characteristic quality. Repeated pain often creates a pattern grossly different from the initial pain sensation.

2. **Pharmacologically**—pain is suppressed with the depression of the central or peripheral nervous system. Pharmacologists have for a long time recognized the numerous facets of pain relief following the administration of an analgesic:

"Relief of pain due to the specific analgesic action of the drug.

Relief of pain due to the spontaneous decline of pain.

Relief of pain due to the effect of suggestion, as in placebo."[5]

3. **Neurologically**—"the ability to perceive pain depends upon the continuity of relatively simple and primitive nerve connections. The reaction to pain, on the other hand, is modified by the highest cognitive function, and this reaction depends in part upon what the sensation means to the individual in the light of his life experience."[6]

4. **Psychologically**—in part, pain appears to be a conditioned human behavior, a state of fluctuating awareness, influenced by the attention, and by the educational, religious and experiential background of the individual.

INDUCTION

Breaking through the patient's psychological everyday awareness, and maintaining his attention to one particular idea (monoideism), has been, and always will be, the major problem not only in therapy but also in examination and diagnosis.

The physician who is aware of this existing psychological phenomenon—*doctor-patient relationship* — can maintain or re-establish it on many occasions with the minimum of effort on the part of the patient and to himself. The physician can direct the patient's undivided attention to some of his past experiences in everyday life, very often a well-remembered painless experience after a preoccupation in sport, hobby, or work. At such time he manipulated his own attention to the exclusion of his being conscious of the injury. The patient is assured now that since he was able to do it then, he can do it now, too. The physician can express a willingness to help him re-experience once again such a phenomenon[7].

Formal induction of hypnosis per se, as a rule, is a relatively rare experience in the average medical practice or in the emergency room. The most effective technique probably lies in the recognition of the various facets of the individual's personality, in understanding the various stress situations to which he is exposed, and finally, in realizing how he is conditioned to respond to those stresses and environment. The organization of the individual's behavior and the utilization of his responses then become a technique in the reorientation of symptomatology and therapeutic approaches.

Because such altered behavior and response to stimuli defy accepted scientific explanation, hypnotic parlance has invaded the field attempting to define this psychological phenomenon.

CONCLUSION

The utilization of patient's altered behavior is a useful psychological modality in meeting the patient "half way" medically in his traumatic "trials and tribulations." It should be used to alleviate his fears and stresses of the traumatic situation. It should be used to enable him to accept the indicated therapy with the required rationale; and to create for him a comfortable postoperative period.

Hypnosis was never intended to replace chemical anaesthesia.

The following basic approaches in this doctor-patient relationship have been most gratifying in most instances to the patient and physician alike.

1. Let us look at the individual as an organically and emotionally functional organism responding to suggestion in a continuum through his various sensory portals.

2. Let us look at his altered psychological status (trance state), as self-induced and as a purposeful phenomenon, yielding to some manipulation by environment and properly

timed and properly chosen therapeutic suggestions.

3. Let us look at the properly utilized suggestion as the basis for maintaining and re-establishing this self-induced psychological trance phenomenon.

4. Let us look at the trance state as a permissive phenomenon, heterogenously induced under many pretenses during therapy, always gratifying the patient's need[8].

5. Finally, let us look at the physician's responsibility of recognizing the phenomenon of patient's response to suggestion and of incorporating it in the therapy when so indicated.

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The address was accompanied by 95 slides, 25 of which were cartoons depicting the artists' conceptions of the uses and misuses of the various forms of suggestion in the practice of medicine. The remaining slides were of the existing traumatic conditions and problems encountered in the emergency or the operating room, the method of surgical approach in the various stages (some were performed under self-induced anaesthesia) and finally the postoperative result of the reconstructive process.

Fluothane® and the Anesthetist*

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Almost 4 years have passed since Fluothane® was introduced into clinical anesthesia by Raventos and by Johnston. Since then it has been the subject of more than 200 reports and has been administered to more than 1,000,000 patients. It has been rejected completely by some and accepted enthusiastically by others. Sufficient information is available now to permit some valid conclusions about the drug.

PHYSICAL PROPERTIES

Fluothane® is a pleasant smelling, non-irritating, colorless liquid which boils at 50° C. The vapor is heavier than air, and, like the liquid, it is nonflammable and nonexplosive. It has an oil/water solubility ratio of 330, which infers that the drug is 3 times more powerful than chloroform. It is compatible with soda lime and very stable. It is stored in dark bottles to prevent breakdown of the liquid, which might result in liberation of the acids of bromine and chlorine. It is unlikely that these will be present in sufficient quantity to be significant clinically.

ADMINISTRATION

Fluothane® can be administered by any of the common inhalation methods. Ordinarily it is given by the semiclosed method, with carbon dioxide absorption. It is so potent that never more than 2% should be present in the inhaled atmosphere. For this reason, neither the open drop nor the closed techniques should be used, for both methods allow dangerous concentrations to build up quickly.

Marked changes in concentration are to be avoided, and an extremely accurate vaporizer is essential. The Fluotec vaporizer is accurate and simple to use (Fig. 1). This instrument is temperature compensated, and accurate when the rate of flow is greater than 4 liters per minute. One merely dials in the desired concentration.

An anesthesia machine which has a copper kettle can be used to vaporize the drug. The Abajian scale is used to determine the flow through the kettle to give the desired concentration (Fig. 2). If the room temperature is 70° F., a flow of 5 liters per minute is required for a 1% concen-

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®Ayerst Laboratory.

*This paper represents the personal viewpoint of the authors and is not to be construed as a statement of official Air Force policy.

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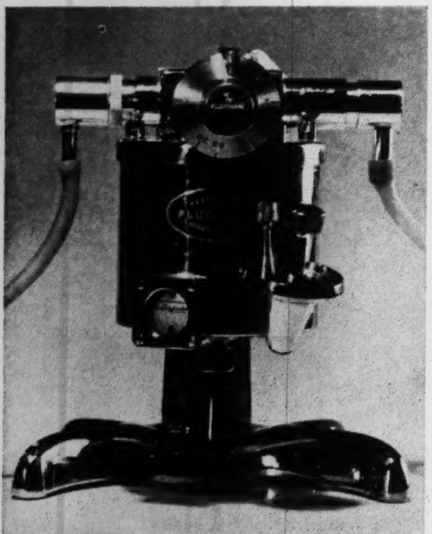

Figure 1. Fluotec vaporizer.

tration when 100 cc. of oxygen pass through the kettle. Doubling the flow through the kettle, to 200 cc. per minute, will double the Fluothane® concentration provided the total gas flow through the machine remains 5 liters per minute. In this manner, any desired concentration can be given if the temperature of the room is known.

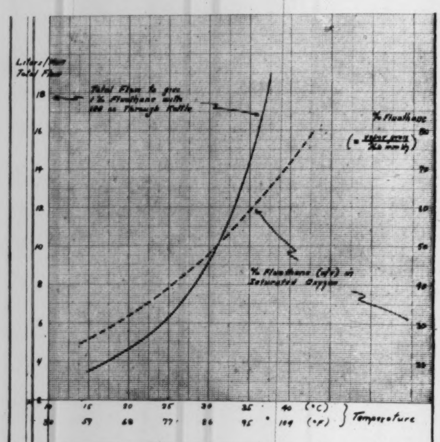

Figure 2. Abajian scale.

Machines which have a Vernitrol come equipped with a calculator permitting variation in both the flow per minute through the machine and the percentage of Fluothane®. The vapor pressure of Fluothane® is determined according to the temperature of the room (Fig. 3). The desired flow per

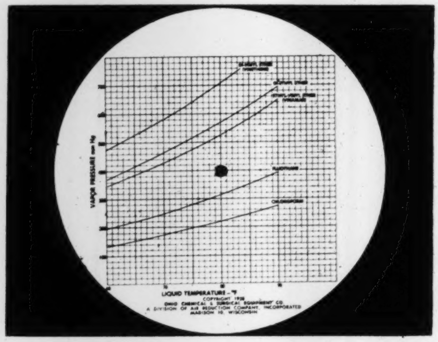

Figure 3. Vernitrol calculator (back).

minute is set below the desired concentration, and the vapor pressure, as previously determined, is located on the right-hand scale (Fig. 4). Now the rate of flow through the Vernitrol that is necessary to give the desired concentration is read immediately above the vapor pressure.

Figure 4. Vernitrol calculator (front).

These calculations may seem complex, but they are absolutely neces-

sary if the drug is to be administered safely. Wild fluctuations in the concentration of Fluothane®, or concentrations above 2%, will only cause the anesthetist trouble.

The rapid changes in anesthetic depth and vital signs make it mandatory that the patient be monitored closely. An esophageal stethoscope or a stethoscope strapped to the chest should be used on every patient. In addition, the blood pressure should be taken at 1 or 2 minute intervals for the first 30 minutes of anesthesia during all intra-abdominal manipulation, and whenever the blood pressure starts to fall. At other times, it should be taken and recorded at least every 5 minutes.

PHARMACOLOGICAL EFFECTS

Nervous System. Fluothane® is a 100% agent; that is, complete anesthesia can be achieved with adequate amounts of oxygen. It is the most potent anesthetic agent in clinical use today. Light anesthesia is maintained with 0.4%-0.8% Fluothane® in the inspired air, moderately deep anesthesia with 1.0% - 1.2% concentrations, and deep anesthesia with 1.5%-2.0% Fluothane®. Concentrations above 2% are rarely, if ever, indicated.

The induction of anesthesia with Fluothane® alone is slower than most people realize. In our experience, unpremedicated adults have breathed 1% Fluothane® for 4 minutes without losing consciousness. The usual period of induction, following normal premedication, and using slightly larger concentrations, is between 10 and 15 minutes. This can be hurried by using ultra-short acting barbiturates, nitrous oxide, or both. Relief of pain is also slow in onset, and the patient will usually require 15 to 20 minutes of pure Fluothane® anesthesia before the skin incision can be made.

At the end of the anesthetic, Fluothane® is released from the body gradually. Ordinarily the patient will be fully awake in 15 to 45 minutes, depending on the duration of the anesthetic and the depth of anesthesia. Protective reflexes usually return a few minutes after the anesthetic administration has been stopped.

Cardiovascular System. Hypotension is common. This is early in onset, and will vary with the speed of administration and the depth of anesthesia. The exact cause is still unknown, but initially, peripheral resistance is diminished. This permits peripheral pooling, and the return of blood to the heart is diminished. If the plane of anesthesia is deepened, the ability of the heart to pump blood is surely reduced. Hypotension is much more common if an ultrashort acting barbiturate is used to induce the patient. The larger the inducing dose of the barbiturate used, the greater will be the incidence and the degree of depression.

The hypotension usually occurs early, almost immediately after induction of the anesthetic; then, the pressure returns to normal. Later, another drop in pressure will occur, followed usually by a plateau at a level higher than the initial hypotension. A sudden and profound drop in pressure may occur, associated with intraabdominal manipulation.

The hypotension is accompanied by a bradycardia. The sympathetic nervous system becomes inactivated in some manner, but the parasympathetic nervous system remains intact. This produces a relative parasympa-

thetic overbalance, and this overbalance may be, in part, the cause of both the bradycardia and the hypotension. For this reason, atropine in a small dose (0.1 mg.-0.2 mg. intravenously) frequently will restore the blood pressure and pulse rate to normal, especially if these changes are caused by intra-abdominal manipulation.

The treatment of the hypotension is the same whenever it occurs. The concentration of the anesthetic agent should be reduced. If the hypotension is accompanied by bradycardia, atropine can be given. All manipulation should stop if the drop in blood pressure is severe. At times, it is necessary to give a vasoconstrictor, such as phenylephrine.

Respiratory System. In concentrations of 1.5%-2.0%, Fluothane® depresses respiration considerably. Usually, with a diminished tidal volume, a tachypnea develops. This results in the more rapid movement of the dead air space back and forth, with a reduction in the quantity of air that actually enters the alveoli. As a result, carbon dioxide levels in the blood will rise, and the patient will go into acidosis. Usually the tachypnea will be reduced, but not completely eliminated, by narcotic premedication. Light levels of anesthesia will not impair the respiration.

Once respirations are assisted, the patient's desire to breathe seems to vanish, and controlled respirations are easily instituted. When this occurs, it is always best to diminish the concentration of Fluothane® administered.

The upper respiratory tract is quickly depressed by Fluothane®. Secretions are diminished or absent in all cases. Pharyngeal reflexes are obtunded in light planes, and airways can be inserted early in the course of the anesthetic. Laryngeal reflexes are also obtunded, but at slightly deeper levels of anesthesia than the pharyngeal reflexes. Endotracheal intubation is easily accomplished on patients under 1.5%-2.0% Fluothane®, but many prefer to use a muscle relaxant, such as succinylcholine, to facilitate intubation. The otolaryngology service prefers that their patients be anesthetized with this agent because of the almost complete absence of pharyngeal reflexes during the surgical procedure.

Gastrointestinal System. When Fluothane® was first introduced into clinical anesthesia, it was feared that, being a halogenated agent, it would be toxic to the liver. It has been thoroughly demonstrated that such a toxicity is only theoretical. In our experience, the repeated administration of Fluothane®, up to as many as 50 times to the same person, has failed to be toxic to the liver.

The remarkable diminution in the incidence of vomiting postoperatively has been one of the outstanding features of the drug. In some clinics, the incidence of vomiting has been as low as 2%. Quite frequently, the patient will not only awaken quickly, but will also be hungry.

Genitourinary System. Fluothane® has no adverse effects on the kidneys, other than the usual depression of urine formation that accompanies deep levels of all anesthetic agents.

At first, it was thought that Fluothane® would cause a high incidence of postpartum hemorrhage. The use of lower concentrations of Fluothane® has proved to be successful. It can be recommended for obstetrical use, where its low incidence of vom-

iting and speed of recovery make it an especially useful agent.

INCOMPATIBILITIES

Curare has the ability to depress the sympathetic ganglia. This, in itself, will lead to only a mild hypotension but, when combined with Fluothane®, will cause a profound drop in blood pressure. These two drugs should never be used together. Succinylcholine is safe to use with Fluothane®.

Epinephrine and, to a lesser degree, norepinephrine combine with Fluothane® to produce marked cardiac irritability. It is best to avoid the use of these agents in the same patient because the cardiac irritability may progress to ventricular fibrillation. If a vasopressor is necessary, phenylephrine is satisfactory.

CONTRAINDICATIONS

There are only 3 contraindications to the use of Fluothane® other than the drug incompatibilities, described previously. (1) The first is inexperience in the use of the drug. It is so powerful, and changes in depth of the anesthetized patient occur with such speed, that it is not the agent for the untrained, the inexperienced, or the lazy anesthetist. The administrator of this agent must be well trained, versed in the art of anesthesia, and alert to every change that occurs in the patient. (2) The second contraindication to the use of Fluothane® is the lack of a precise vaporizer for the drug. Concentrations greater than 2% should not be given. (3) The third contraindication is a relative one. Patients in shock may not be able to tolerate the additional hypotension that Fluothane® produces. For these patients, as well as those with marked blood volume deficits, another agent may be more satisfactory.

We do not advocate fitting the patient to a known concentration of the agent. Rather, we stress that the agent must be given with attention paid to the changes which are taking place within the patient. It is necessary to know the concentration of the agent to prevent the accidental administration of dangerous amounts of the drug.

THE FUTURE

Fluothane® will be used more and more as additional experience is gained with the drug. It will never replace any of the agents in use today, but it will become one of the most popular agents.

It will be used primarily with nitrous oxide inasmuch as that agent will hasten the induction and permit the use of lower concentrations of Fluothane®.

CONCLUSION

Fluothane® is a pleasant, nonexplosive, general anesthetic agent which is easy for the trained anesthetist to administer. Following the induction, it is extremely rapid. It is a powerful anesthetic and must be used with caution. Its chief drawback is hypotension, and this can be minimized by a slow induction, with a gradual increase in the concentration until the desired strength is attained. Eventually, Fluothane® will become one of the popular agents in general anesthesia.

Some Common Effects of Anesthetics on the Circulation

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There are a number of reasons why we are interested in the circulation during anesthesia. The first and most important is that circulation is an integral part of respiration in both the lungs and tissues. The supply of oxygen and the removal of carbon dioxide depend, therefore, on adequate circulation. Furthermore, the blood flow to the body depends largely upon the demand for oxygen as indicated by the fact that the output of the heart is directly related to the basal oxygen consumption. Failure to supply oxygen-laden blood to the tissues leads to failure of function and permanent injury, the best example of which is cardiac arrest and the cerebral damage which follows.

Aside from this basic consideration a second reason why we seek to maintain the circulation is that we must depend upon blood flow for the uptake and distribution of anesthetics. This is true whether we use inhalational, intravenous, or rectal technics. A poor circulation leads to difficulty in induction and emergence from anesthesia. It is our aim to circulate the anesthetic to the brain and to produce narcosis. Unfortunately the very circulation we depend upon carries the anesthetic to other tissues such as the heart, liver, and kidneys where undesirable depression may result. A final point of interest is that circulation of blood is a major factor in the regulation of body temperature. Vasodilatation or vasoconstriction during anesthesia can lead to heat loss or retention. This aspect of the circulation is particularly important in infants and children, in the febrile, and in the technic of cooling and rewarming for hypothermia.

How, then, do we observe the circulation during anesthesia? The methods we have are rather crude. We measure the blood pressure by the auscultatory technic and we count the pulse. Observation of the color of the blood and the amount of bleeding in the operative wound, observation of capillary refill, and of skin pallor or congestion, add additional information. But the measurement of blood pressure gives us only an overall picture of what is going on. In the presence of an adequate systolic pressure, blood flow to individual organs, such as the kidneys and liver may be considerably decreased because of vasoconstriction. For example, a patient in hemorrhagic shock may have the same systolic blood pressure as the patient under spinal anesthesia but in the former instance there is

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generalized constriction of blood vessels, in the latter vasodilation.

The blood pressure which we observe either in the body as a whole or in localized vascular areas always depends upon the amount of blood flow and the resistance to flow. This may be expressed as follows:

A. Pressure=Flow x Resistance

This formula applies to any hydraulic system. We can say that the water pressure in our pipes at home is the result of that amount of water which enters from the reservoir, further increased or decreased by the resistance to flow in the plumbing. If the reservoir or flow is depleted we observe low pressures. If a leak is sprung and the resistance falls we again have a fall in pressure. It is easy to think of the human circulation in these terms. Another way to express this is:

B. Blood Pressure=
Cardiac Output (Flow) x Blood Vessel Resistance (Constriction or Dilatation)

With this scheme in mind let us now determine how anesthetics may affect the blood pressure in terms of the effect either on cardiac output or on blood vessel resistance to flow.

Anesthetics can affect cardiac output by decreasing the force of myocardial contraction[1]. Any general anesthetic with the exception of nitrous oxide may do this[2]. The degree of depression is directly proportional to the depth of anesthesia, more specifically to the concentration of anesthetic in arterial blood circulating to the heart. Ordinarily in a carefully given anesthesia we do not observe a fall in blood pressure in the presence of slight to moderate myocardial depression because of compensatory vasoconstriction (See formula B above). This vasoconstriction for some reason or other takes place in the splanchnic area, a region of major blood flow to the liver and kidneys[3, 4]. Perhaps this is responsible for some of the alterations in liver and renal function which may be observed postoperatively. On other occasions we may observe a fall in blood pressure particularly during ether, Fluothane, ethyl chloride, or chloroform anesthesia. This suggests that there is myocardial depression which has not been counteracted by sufficient vasoconstriction. Indeed, peripheral vasodilatation in deep anesthesia only adds to the hypotensive effect of anesthetics on the heart.

Recent experiments suggest that the depressant effect of anesthetics on myocardial contractility may be opposed by the release of epinephrine or norepinephrine within the body[5]. Epinephrine and norepinephrine, to a lesser extent, increase the force of myocardial contraction. Ether has a particular tendency to stimulate release of these pressor substances. Perhaps there are variations in the capacity of the individual patient to secrete adrenalin. This may explain why the elderly patient or the patient in poor condition becomes hypotensive so readily upon the administration of ether. Similarly, a patient who has had a thoracolumbar sympathectomy or adrenalectomy which might deprive him of epinephrine and norepinephrine might fare poorly from the circulatory standpoint during general anesthesia.

In addition to the effect on myocardial contraction anesthetics can alter cardiac output by decreasing venous return to the heart or by altering the pulse rate. In the former case when there is considerable peripheral vasodilation, less blood is returned

to the heart and the myocardium is unable to pump as much as it ordinarily would. In regard to the pulse a more rapid rate sometimes can increase the cardiac output simply by increasing the number of pump strokes per minute.

We have discussed briefly some possible effects of anesthetics on the cardiac output which may lead to hypotension and poor circulation. Now let us refer to the other factor which maintains the pressure, in formula B above, the resistance or tone of blood vessels. The blood pressure may fall if the cardiac output is unchanged and there is vasodilation in a significant portion of the arterial tree. Similarly the blood pressure may be elevated if vasoconstriction is present as may occur following the administration of certain vasopressor drugs.

Every anesthetist is aware of the fact that the opiates (morphine and Demerol are the common offenders) can produce hypotension. Experiments have suggested that this is mainly due to a depressant effect of these narcotics on the vasomotor center in the medulla just as these drugs depress the respiratory center. Here again we see the close relationship between circulation and respiration. A depressed vasomotor center results in poor vasomotor tone so that an individual will develop hypotension and faint if subjected to a stress such as changing from the supine to the upright position. This is commonly seen when a patient is positioned for operation. The hypotension can be prevented partially by bandaging the legs which decreases pooling of the blood in the extremities. We have mentioned this action of the opiates merely to point out that general anesthetics may do the same thing[6, 7]. Who has not observed hypotension when the legs have been brought down from the lithotomy position or when the patient is moved to his bed at the end of operation? Circulatory responses have been diminished by the anesthetic. One might summarize at this point and say that anesthetics bring about an over all depression of the circulation either through a direct effect on the heart or via the autonomic nervous system by inhibiting the release of epinephrine or through depression of autonomic vasomotor control.

The foregoing discussion has touched on some of the highlights of the problem of the effect of anesthetics on the circulation. In reference to the narcotics a word was said about pre-anesthetic medication. Little mention was made of the individual characteristic effects on the circulation of certain of the anesthetics. All of us recognize that the effects of ether are different from those of cyclopropane[8]. Fluothane, chloroform, and ethyl chloride present distinguishing characteristics. The circulatory effects of spinal anesthesia are worthy of considerable discussion alone[9]. Furthermore anesthetic technics such as controlled respiration add their special burden to the circulation. The lesson to be learned is that potent anesthetics in addition to producing narcosis have many side effects. Those of chief concern relate to the circulation and respiration because of their basic importance in survival. In order to avoid undesirable effects, anesthetics must be administered not only with an eye toward technical perfection but with a knowledge of the basic pharmacological and physiological alterations which may be encountered.

(Continued on page 56)

Use of a Heart Lung Machine in Cardiac Surgery

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Although surgical treatment for heart disease has been available for many years, definitive treatment of intracardiac abnormalities required the development of methods whereby the heart chambers could be entered and lesions treated under direct vision. The first step in this direction was the use of general body hypothermia which reduces the tissue oxygen demand. When the body temperature was reduced to about 28-32° C, the blood flow through the heart could be arrested temporarily and some intracardiac lesions treated. The major drawbacks of this method were: 1) the time limits of the intracardiac procedure (± 8 minutes) 2) the ventricular chambers could not be entered without excessive hazard. The successful development of heart lung machines overcame these problems so that the vast majority of cardiac abnormalities are now accessible for definitive surgical treatment under direct vision.

The function of these machines is to divert the venous blood from the inferior and superior vena cava to a device which will oxygenate the blood and remove adequate amounts of carbon dioxide. The arterialized blood is then pumped into the systemic arterial system, usually via the femoral artery. Thus when the heart lung machine is in operation the only blood that enters the heart is from the coronary sinus (into the right atrium) and from the bronchial vessels (into the left atrium via the pulmonary veins). The chambers of the heart can now be opened (cardiotomy) to correct intracardiac defects under direct vision. These procedures are known as open heart surgery during total body perfusion (or cardiopulmonary bypass). The purpose of this paper is to report the results of surgery in 100 consecutive patients in whom the heart lung machine was used for the treatment of congenital heart disease during the last three and one-half years. The role of the anesthetist as a part of the surgical team will be emphasized and the use of monitoring devices stressed.

METHOD

A. Anesthesia

The patients were premedicated with Nembutal®, Demerol® and atropine. The dose of these drugs varied according to the age and weight of the subjects. Adults received about 100 mgms. Demerol®, 0.4 mgms. atropine and 100 mgms. Nembutal®. The dosage schedule for infants and children was as described previously.[1]

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Originally, induction of anesthesia was started with a small dose of Pentothal Sodium® intravenously (± 50 mgms. of a 2.5% solution) followed by a mixture of nitrous oxide, oxygen and ether using the high liter flow technique. To facilitate endotracheal intubation, transtracheal block with 5% Cyclaine® was used in adults.

In children, open drop ether was given after Pentothal Sodium® induction until anesthesia was deep enough to permit the insertion of an endotracheal tube. More recently the anesthetic agents used were a mixture of Fluothane[2], nitrous oxide and oxygen. When premedication was inadequate in children, a sleeping dose of Pentothal Sodium® was given prior to the use of nitrous oxide, oxygen and Fluothane. Ether was added to this mixture prior to endotracheal intubation in some children. The more recent anesthesia technique in adults consisted of induction with Pentothal Sodium® followed by the administration of Fluothane, ether, nitrous oxide (flow of 2 liters per minute) and oxygen (3 liters per minute). Ether was discontinued after endotracheal intubation was accomplished and anesthesia was maintained with low percentages of Fluothane, nitrous oxide and oxygen.

Ventilation was accomplished by augmented respiration until the pleura was entered. At that time Demerol® was given intravenously to abolish the respiratory drive and ventilation was continued using the "hand and bag" method. During the period of total body perfusion the lungs were ventilated with 100% oxygen. Anesthetic gas mixtures were not added to the heart lung machine. In the majority of instances supplemental anesthesia during the period of cardiopulmonary bypass was not necessary. However, a solution of 2.5% Pentothal Sodium® was available at all times and was given into the heart lung machine when indicated. When total body perfusion was discontinued a small percentage of Fluothane was again introduced and respirations controlled until the chest was air tight. Spontaneous respirations were then re-established. Towards the end of the procedure ventilation was assisted with a mechanical respirator to ensure an inspiratory pressure of about 10 cms. water.

Throughout the whole procedure great care was taken to maintain a clear airway to attempt to prevent the onset of acute or prolonged partial hypoxia. This was accomplished by the optimal placement of the endotracheal tube, intermittent aspiration of tracheobronchial secretions and the prevention and treatment of bronchospasm. After the chest incision was closed prophylactic tracheostomy was performed in those patients in whom a stormy postoperative course was predicted. This included patients who had severe pulmonary hypertension, recurrent or recent pneumonitis, or poor risk subjects with severe cardiac malformations. The presence of the tracheostomy tube allowed continued assisted inspiration with a mechanical respirator and a method for adequate aspiration of tracheobronchial secretions in the immediate postoperative period. In the majority of patients tracheostomy was not performed and they were placed in an oxygen tent for 2-3 days after surgery.

B. The Heart Lung Machine

The Clark bubble oxygenator and pump was used in all patients. Details of the apparatus have been published

elsewhere.[3] Venous blood was arterialized with oxygen bubbles of varying size. Small bubbles (10-50 micron) have a large surface and are extremely efficient in oxygenating the blood. The flow of large bubbles (200-500 microns) will remove excess carbon dioxide. The oxygen gas flow was controlled by the arterial oxygen tension and pH (see later). If the oxygen tension fell below the desired level the flow of small bubbles was increased. If the pH fell (i. e. the blood became acidotic) the flow of large bubbles was increased to remove more carbon dioxide. The blood and gas mixture was then allowed to flow over teflon shreds covered with silicone (polymethylsiloxane). This material coalesced the excess gas. The arterialized blood then entered the pumping chamber which was electronically controlled so that the flow rate was known at all times. The blood entered a monitoring chamber before it was returned to the patient. In the latter chamber the oxygen tension, pH and temperature of the blood were measured.

The patients' venous blood was brought to the heart lung machine via two catheters inserted into the superior and inferior vena cavae. The arterialized blood was returned through a cannula placed in the femoral artery with its tip facing proximally. Thus the blood flow in the aorta was retrograde during the period of perfusion.

The left heart was decompressed in all patients by the insertion of cannulae into the left atrium and left ventricle. The blood from these chambers was aspirated and returned to the heart lung machine. During cardiotomy intracardiac blood was aspirated with hand suckers and returned to the oxygenator. In specific patients the coronary circulation was controlled by occluding the ascending aorta between the origin of the coronary arteries and the innominate artery. In these circumstances viability of the myocardium was protected by stopping the heart beat with coronary perfusion of potassium citrate in the earlier cases and local myocardial hypothermia ($\pm$ 17° C) in the later patients.

C. Monitoring Devices

1. *Systemic Blood Pressure.* A blood pressure cuff was attached to the upper arm of all patients. Auscultatory measurements were relied upon only at the beginning and the end of the procedure. In all patients prior to the preparation of the surgical field a peripheral artery, either the radial at the wrist or the brachial at the antecubital fossa was cannulated for the direct measurement of mean arterial pressure. The cannula was attached to a simple mercury manometer. The reference zero point of the manometer was the mid point of the anteroposterior diameter of the chest. (Fig. 1) Pulsations of the mercury column synchronous with the heart beat ensured that the system was open. The cannula was left in situ until the end of the surgical procedure and was removed only when the blood pressure could be measured without difficulty using the auscultatory technique.

2. *Venous Pressure.* In the first 30 patients of this series, mean venous pressure was measured from both the superior and inferior vena cava. More recently the venous pressure was measured only from the inferior vena cava after this vessel was cannulated from the saphenous vein at the groin. The cannula was attached to a simple water manometer and the reference zero was the mid point of the antero-

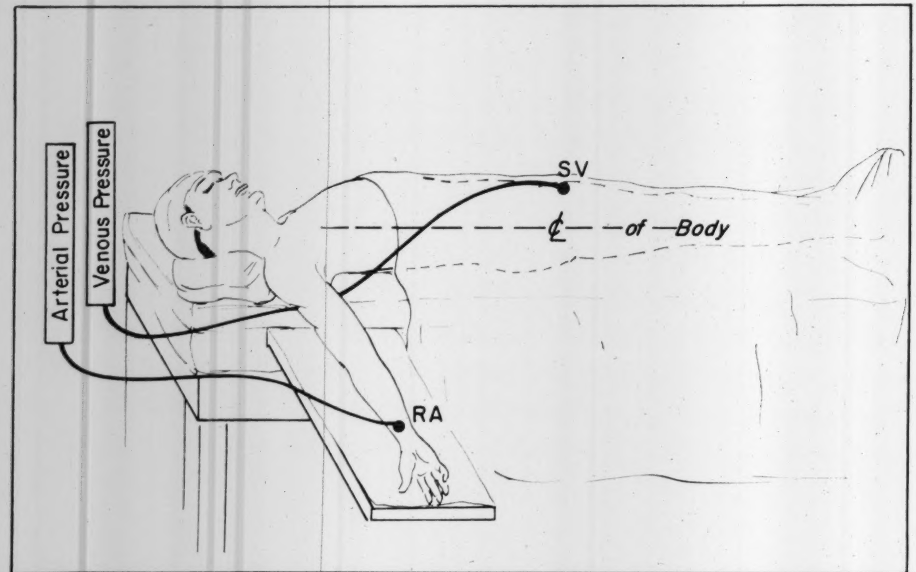

Fig. 1 Schematic representation of manometric measurement of mean arterial and venous pressure. RA=radial artery, SV=saphenous vein, CL of body=reference zero point.

posterior diameter of the chest. (Fig. 1) This system was left in situ until the end of the procedure.

3. *Temperature.* After induction of anesthesia, a thermistor[4] was inserted into the esophagus for the measurement of body temperature. (Fig. 2) The monitoring chamber of the heart lung machine contained another thermistor to measure the temperature of the arterial blood. All of the patients were perfused in normothermia. The extracorporeal blood temperature was controlled by a heating device in the heart lung machine.

4. *Electrocardiogram.* Needle electrodes were placed subcutaneously for oscilloscopic monitoring of the electrocardiogram. (Fig. 2)

5. *Electro-encephalogram.* Small needles were inserted subcutaneously, one in the frontal area and another in the occipitotemporal area for the oscilloscopic monitoring of the electroencephalogram. (Fig. 2)

6. *Arterial Oxygen Tension.* The Clark oxygen electrode[5] was used to continuously record the arterial oxygen tension in the heart lung machine prior to the return of the arterial blood to the patient. As indicated above, the level of the arterial oxygen tension was controlled by the flow of small bubbles of oxygen into the heart lung machine. Mixed venous blood was sampled intermittently for oxygen saturation determinations.

7. *pH.* Electrodes in the monitoring chamber of the heart lung machine measured the pH of the arterial blood.[6] This parameter was recorded continuously during the perfusion. The level of pH was controlled by the flow of large bubbles of oxygen into the heart lung machine.

8. *Flow Rate.* The pulsatile pumping mechanism of the heart lung machine was controlled electronically.[3] The stroke volume was calibrated prior to each perfusion. Each pump

stroke was recorded as was the number of strokes per minute. Thus the rate of flow of blood from the machine to the patient was known at all times.

9. *Blood Volume*. The methods of controlling blood volume have been described previously.[7] In summary they depend on the following: (1) the level of the arterial and venous pressures and their relationship to each other (2) blood loss as estimated from sponge weight, discard suction volume, pleural space drainage and loss on the drapes (3) the effects of blood transfusions or the removal of blood from the heart lung machine.

RESULTS

The nature of the congenital lesions and the results of surgery are shown in Fig. 3. The ages of these patients varied from 10 months to 52 years. As indicated, the mortality rate was 14%. Three patients died within 24 hours after surgery and the remainder succumbed within six weeks after perfusion. The commonest cause of death appeared to be related to severe pulmonary hypertension which compli-

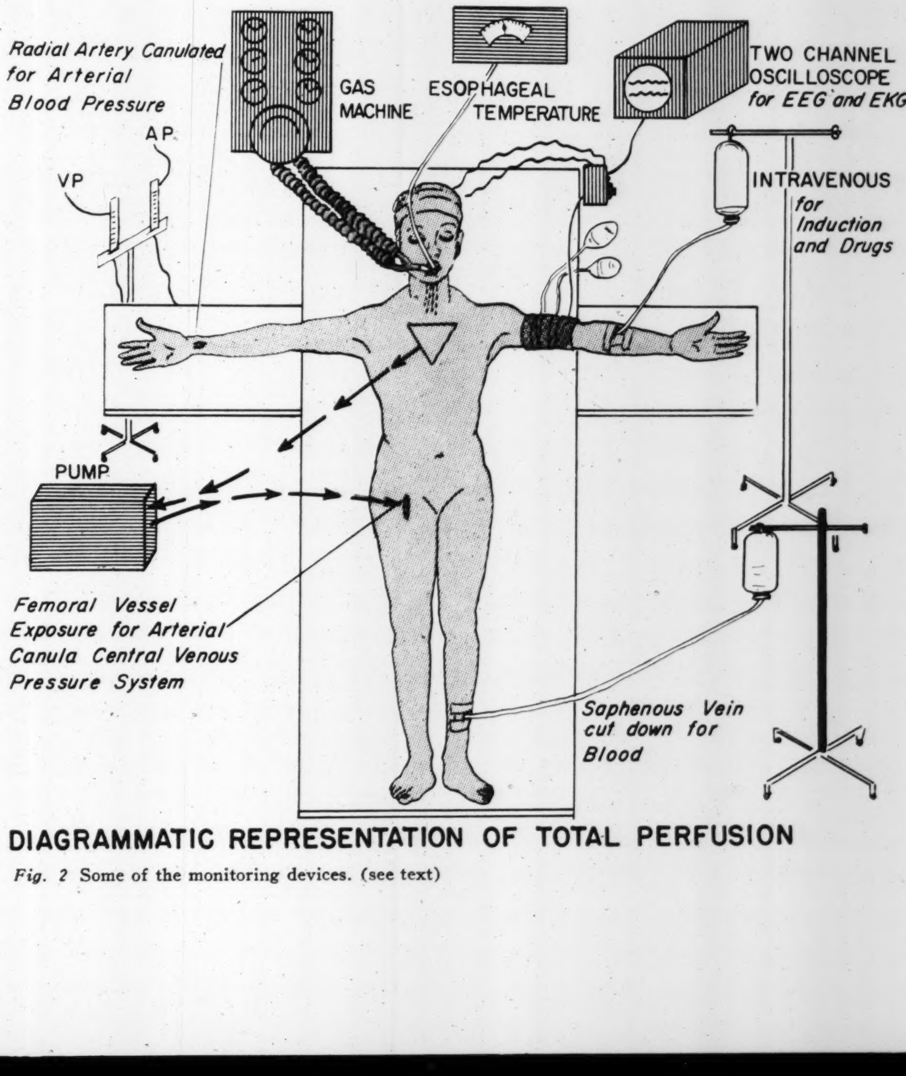

Fig. 2 Some of the monitoring devices. (see text)

LESION	NO.	DEATHS	REMARKS
Ventricular Septal Defects	24	4	Extreme Pulmonary Hypertension
Secundum Atrial Septal Defect	20	1	Extreme Pulmonary Hypertension
A. S. D. + Anomolous Pulmonary Veins	9	0	—
Total Anomolous Pulmonary Veins	4	0	—
Ostium Primum A. S. D.	8	0	—
Aortic Stenosis	11	1	Extreme Valvular Calcification
Tetralogy of Fallot	15	7	Previous Blalock Op. 4 Complete Heart Block 1 Aortic Insufficiency 1 Pseudomonas Infection 1
Pulmonary Stenosis (Valvular + Infundibular)	8	1	Low Blood Volume
Ruptured Sinus of Salsalva	1	0	—
Total	100	14	—

Fig. 3 Results of surgical treatment.

cated the congenital defect and anteceded the surgical procedure. There were no deaths which could be attributed to the anesthesia or the heart lung machine.

A representative example of the physiologic control during perfusion is shown in Fig. 4. In the majority of patients a definite fall of the systemic mean arterial pressure was noted soon after occlusion of the vena cavae. The mechanism of the hypotension has been described previously[7] and is probably due to peripheral vasodilation. However, there were no deleterious effects produced by the low blood pressure and in particular, there were no instances of cerebral damage or anuria. Also vasoconstricting drugs were not used. As the perfusion proceded the mean arterial pressure returned to acceptable levels in the majority of patients, although in some

instances it remained between 45-50 mms. Hg. throughout the intracardiac procedure. When the vena cavae were released and a normal blood volume established, the mean arterial pressure returned to normal. When large volumes of citrated blood were necessary after perfusion, intravenous calcium was given (up to 500 mgms. calcium gluconate for each 500 ml. citrated blood). This therapy invariably produced a salutary effect on the mean arterial pressure. The central venous pressure usually rose during the intracardiac procedure. (Fig. 4) The mechanism of this change has been described previously.[7] In summary the factors involved may include the following (1) relatively small size of venous pickup cannulae (2) malposition of the venous cannulae (3) inadvertent external ab-

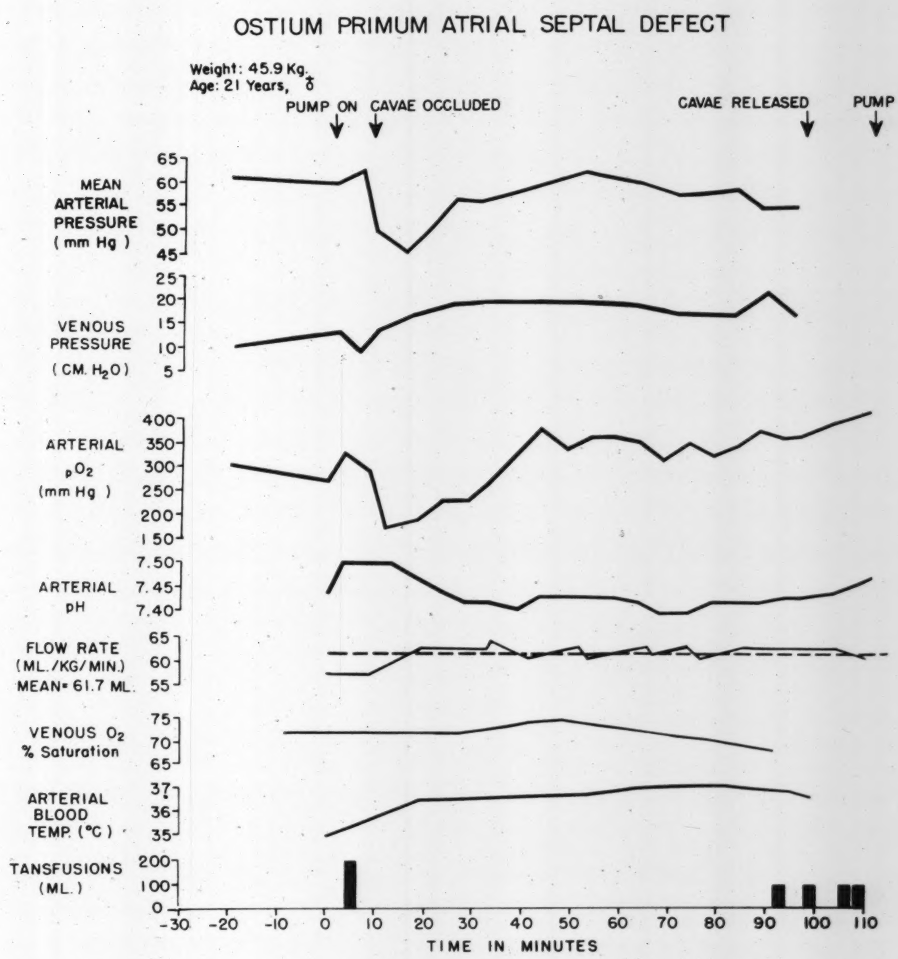

Fig. 4 Representative monitoring of physiologic parameters during total body perfusion. (see text)

dominal pressure. In some patients duskiness of the face was noted with an elevated superior vena caval pressure. This can be prevented by optimal placement of the superior vena cava cannula to prevent partial obstruction of blood flow through this vessel. After excannulation of the vena cavae, the venous pressure usually returned to normal.

The oxygen tension of the arterial blood was maintained at relatively high levels throughout the period of perfusion. (normal ± 120 mms. Hg.) In the majority of patients the arterial oxygen tension was above 300 mms. Hg. during most of the period of cardiotomy. The relatively high oxygen tension was due to a small volume of oxygen dissolved in the plasma. Bubbles of oxygen were not noted in the arterial blood and there were no instances of oxygen embolism.

The pH of the arterial blood remained within normal limits during the period of perfusion. (Fig. 4) Controlled respiration prior to attachment of the patient to the heart lung machine may result in acidosis from carbon dioxide accumulation or alkalosis from over-ventilation. These factors were corrected by varying the volume of large bubble flow into the oxygenator as indicated above. Animal experiments in our laboratories have indicated that a significant metabolic acidosis does not occur during cardiopulmonary bypass so that changes in pH are attributed to carbon dioxide accumulation or loss. Postoperative respiratory acidosis comparable to that reported in patients undergoing thoracotomy for procedures not involving perfusion, may occur but is mild and of short duration.[8]

The rate of flow of arterial blood from the apparatus to the patient varied according to the weight of the patient.[8] In the example shown in Fig. 4 the average flow rate was 2832 ml. per minute (61.7 ml./KG/min. or 2.0 L/M^2). Because the saturation of the mixed venous blood remained between 70-75%, it may be assumed that the oxygen requirements of the tissues were supplied adequately.

Blood transfusions during perfusion were necessary in the majority of cases. (Fig. 4) The indications for blood transfusion were one or more of the following[7]: (1) a low and falling mean arterial and central venous pressure (2) "flutter" in the venous pickup line (3) inadequate venous inflow into the heart lung machine when mechanical factors such as kinks in the line or poor placement of the cannulae could be excluded (4) a sudden accidental loss of blood (5) if the mean arterial pressure is not well maintained, although the central venous pressure is normal, transfusion could be considered.

Oscilloscopic visualization of the electrocardiogram was found to be useful throughout the whole procedure. On occasion impending hypoxia was preceded by the development of any arrhythmia, usually ventricular extrasystoles. Complete heart block occurred during cardiotomy in 4 patients with ostium primum atrial septal defect, 2 patients with tetralogy of Fallot and 2 patients with ventricular septal defects. This complication was treated with large doses of intravenous Isuprel® which reverted the heart block to sinus rhythm in 5 instances. One patient succumbed to heart block 1 month after surgery. In 2 instances complete heart block has persisted. The followup period in these latter patients

is 3 years and 18 months. To date the implantation of myocardial electrodes has not been necessary.

Although the electro-encephalogram was visualized oscilloscopically in this group of patients, its value has been dubious. It is believed that deterioration or flattening of the waves of the electro-encephalogram are late manifestations of cerebral damage. Usually the other monitoring devices described above heralded the development of a complication which was overcome prior to significant electroencephalographic changes.

DISCUSSION

Laboratory experience with the heart machine in dogs indicated that successful total body perfusion depended in a great measure on the appreciation of physiologic changes occurring during cardiopulmonary bypass. This experience was transferred to the operating room where the above mentioned monitoring devices were found to be essential in the success of the surgical procedure. We believe that these monitoring devices do not make the operation more complex. In many instances they forewarned the operating room team of impending complications which were not recognized by clinical observation of the patient. These complications were anticipated and controlled before they appeared. The basic principles of total body perfusion depend on optimal oxygenation of blood, removal of adequate amount of carbon dioxide and a flow of blood to meet the metabolic requirements of the body. Therefore it is a fundamental requirement that variation of these parameters be known at all times during total body

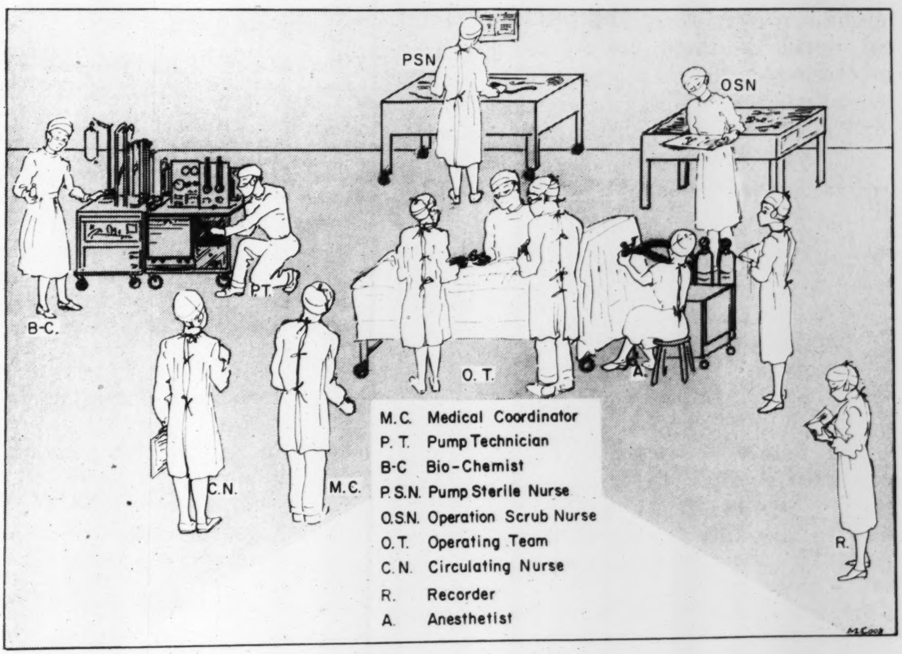

Fig. 5 Personnel involved during total body perfusion.

perfusion. This was accomplished by the monitoring described above.

Fig. 5 represents the personnel of our clinic during surgery with the heart lung machine. They consist of the following groups: (1) operating surgeon, assistants and scrub nurse (2) pump operator, biochemist and scrub nurse (3) anesthetist (4) recorder (5) coordinator. The latter individual acts as a liaison between the other groups. It is his function to advise the pump operating team of changes in the operative field which would influence perfusion techniques in specific patients. Physiologic changes related to anesthesia and blood volume are controlled and treated by the coordinator. He also acts as the direct liaison between the surgeon and the other groups. This system has allowed the surgeon to proceed with the intracardiac procedure without being concerned with the minutia of physiologic and biochemical detail of these major surgical procedures.

SUMMARY

(1) The results of surgery in 100 consecutive patients in whom the Clark heart lung machine was used for the treatment of congenital heart disease is reported.

(2) The role of the anesthetist in these procedures is emphasized.

(3) Monitoring devices to control physiologic and biochemical changes are stressed.

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Hypnosis

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The development of anesthetic drugs and their safe effective administration has been the subject of intensive study with a resultant tremendous progress for over one hundred years. Measured in mankind's recorded period of history, this is but a brief period indeed, and much of the healing art depended for centuries, for pain relief on psychological processes which are now again being studied with renewed interest and clinical integration in today's practice of anesthesiology. Veiled in mysticism and closely bound with religious rituals, this form of treatment did not receive a name until Dr. Anton Mesmer called it "animal magnetism" and invited scientific inquiry into the nature of trance production and the healing processes he achieved so dramatically. The scientists of his day disproved his theories and it remained for James Braid, in 1843, to give us the name "hypnosis" from the Greek neurypnology, meaning "nervous sleep", for this series of phenomena.

Kept alive in the scientific field by students and practitioners of psychology and psychiatry, hypnosis was soon crowded out of the surgical picture by ether in 1846 and subsequent developments in chemical anesthesia. We have scanty source material for reports of the use of hypnosis in surgery until just the past decade. James Esdaile's "Mesmerism in India," originally published in 1850, gives us a most interesting and authenticated account of his experiences in the use of this technique to produce insensibility to the pain of surgery of all magnitudes and to facilitate healing. His mortality dropped from about fifty percent, a common figure for that day, to five percent. This is all the more remarkable because of the lack of sterile techniques, blood replacement and effective medications against infections.

I shall not go into the varied techniques for trance production nor the many applications made of hypnotic trance states in other disciplines of medicine, but limit myself at this time to a discussion of how we might integrate the use of suggestions in our practice of administering anesthesia. Hypnosis might be said to be a state of mind with altered awareness of one's environment with selective hypersuggestibility, narrowed awareness, selective wakefulness and restricted attentiveness. All of us daily experience some of these traits at one time or another. Commonly encountered states of mind similar to, if not identical to, a hypnotic trance might be experienced in the intervals just preceding falling asleep at night and full awakening in the morning. Again we might experience them dozing off while listening to a lecture or listening to music or drifting into phantasy

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Presented at the Hawaii Workshop, Honolulu, September 4, 1960.

while doing a routine task. How many accidents at the wheel of a car are caused by this dissociation of the mind from the awareness of the situation arising in traffic and on the highway is difficult to determine but the figure must be very high indeed. Should you feel yourself falling asleep during a lecture or recital do not be alarmed for it has been found that learning in a trance state is often more successful than when distracted by everything around you in a state of full wakefulness.

Our first responsibility to our patients is to allay fear and apprehension and prepare them for a calm introduction to the anesthetic or pain-free state to safely undergo surgery. This we can accomplish to a certain degree only with chemical agents as used in pre-medication. The answering of questions, recognition of sources of apprehension and allaying of fears is but good medicine and should not be neglected preoperatively.

We can go a step further giving positive suggestions of reassurance for safety, comfort, and well-being, in a sincere, believable manner. Here our authority as experts in the field of anesthesia gives us the prestige required to not only make such suggestions acceptable, but induce, if we so desire, the hypnotic state simply, easily and often without ever the patient becoming aware that techniques of hypnosis are being used.

We can explain the importance of relaxation to the ease with which a surgeon can do his job, and instruct the patient in letting his muscles go limp, assuming a comfortable position in which all his weight is being supported by the bed or chair or operating table without any effort on his part. As the patient cooperates in relaxing each part of his body which we can suggest he do one part at a time and with encouragement and praise, we compliment his learning skills. We can suggest he imagine himself in a very happy situation in which he might be similarly relaxed. When the patient describes such a situation, we ask that he tell us about it in more detail, utilizing the imagination or memory of all sense modalities to increase the realness of scene his mental image is either creating or recreating.

Now, it might be suggested that when next we meet he immediately easily relax completely, as he is now doing, in absolute comfort and again recreate the pleasant experience he is now enjoying. This might alternatively be directed to take place on receiving premedication drugs or on arrival of the guerney for transport to the operating room. This is a very simple, easy, friendly approach applicable to some patients who might otherwise arrive in the operating room very tense, anxious, and therefore, difficult to induce safely with our chemical anesthetics. Use has been made of light trance induction and post-hypnotic suggestion.

We have to individualize our approach with each patient and a thorough working knowledge of hypnosis helps us recognize the needs of our patients even if we don't use it directly in every case but only make use of suggestions to the degree that we are satisfied the patient can be given the maximum support in an otherwise trying situation. Whereas not all patients are equally susceptible to suggestion nor have the imaginative ability to learn to go into a deep plane of hypnosis quickly, we don't need to feel discouraged. Our premedicant drugs, and our anesthetic

agents decrease the discriminatory powers of the patient and during each induction and emergence from anesthesia, and, indeed, throughout the ultra-light or analgesic maintenance periods, receiving much attention today, patients are capable of learning and heeding suggestions.

It is amazing to hear a patient recall, under hypnosis, sensations and conversations that occurred during previous surgical experiences under supposedly deep anesthesia. This warns us that we must always think of the possibility that some part of the brain is listening in at all times during an anesthetic and thus govern our conduct and conversations accordingly. We can take positive action here by suggesting as the patient falls asleep under our ministrations the phenomena we should like to see occur. These might well relate to calmness, relaxation, easy breathing, coolness and comfort throughout surgery. They can also include postoperative sense of well-being and comfort in the presence of a surgical wound, normal digestive and eliminatory processes and the ability to cooperate well with doctors and nurses in any of their future requests such as to breathe deeply, to cough and to change position comfortably. We could go on at greater length discussing desirable post-anesthetic suggestion responses. Not all patients will do as well as we should like them to in response to our efforts with hypnosis and narcohypnosis and suggestions in the waking state, but then not all patients react to our chemical anesthetics, antibiotics or other forms of treatment in a perfect manner either. I think the results obtained well worth the effort involved particularly when one sees patient after patient, who have undergone intensive surgical procedures, heal nicely and in apparently very comfortable, happy frames of mind.

It might be well to discuss some of the alterations in physiology that can be achieved in a smaller number of subjects through suggestion in deep planes of hypnosis. Remember that marked changes in the sympathetic and parasympathetic or involuntary nervous system functions take place all the time as a result of emotional impact, demands of environmental situations and stress. You may not think it possible to alter blood flow in a capillary bed through suggestion, but that is exactly what happens when you blush in embarrassment, or feel your hands grow cold and moist in apprehension, as before an examination. Likewise, there is a response in the secretory organs of digestion in anticipation of a delightful meal when salivation is increased and stomach motility becomes apparent. Under conditions of stress it is a natural response to feel the need to evacuate bowel and bladder.

The therapist desiring to alter so-called involuntary functions through hypnosis must learn to direct the emotional pattern of his patient in such a way that in an imagined situation, physiological alterations occur as they would during actual experience of the activity. The hypnotized individual who is directed to hallucinate a scene in which he is running in panic, for example, might be found to show an increased circulation, an elevated blood pressure and accelerated pulse and even experience muscle cramps as a result of his effort and metabolic activity. In contrast, I have seen a patient's body temperature drop over four degrees with concomitant lowering of blood pressure and pulse rate and very little bleed-

ing at the site of operation during a two and one-half hour operation under spinal anesthesia during which the patient hallucinated a scene of hibernating through a long cold winter such as certain animals do who reduce their metabolic activities to the bare minimum to sustain life and comfort. We cannot alter our physiologic functions on command nor through direct mental channels but we can alter them through use of the imagination and emotions.

Lastly, we shall mention hypnoanalgesia, or anesthesia by suggestion, because it is occasionally useful. Ordinarily it is too time-consuming to create deliberately and too limited in the number of patients who could easily achieve it, whereas some form of chemical anesthesia is quickly and reliably available in almost all situations. In the deepest trance states, such as were achieved wordlessly through "mesmeric passes" by Esdaile and his assistants, there is such a profound loss of awareness of all surroundings or dissociation of mind from body functions that there is complete anesthesia and unresponsiveness to any physical stimulus. This state may be reached in a relatively few individuals in a matter of minutes but may, for others, require hours of trance induction and deepening techniques and days of repeated efforts to achieve. This we need not attempt with our available chemical anesthetics but was practical in the days before pharmacological assistance.

A simpler form of anesthesia can be achieved through direct suggestion in light or medium trance states. This is usually accomplished through recall of the sensation of numbness that a patient may have experienced with prior local anesthesia as in dentistry or surgery. Or the patient may recreate the numbness experienced in feet or hands after hours of inactivity and circulatory stasis or pressure over nerves. The patient can be directed in the trance state to experience this numbness in a hand e.g. and develop a "Glove anesthesia" such as seen spontaneously in hysteria. When anesthesia can be effectively created in the hand and tests of stimuli prove its effectiveness, this anesthesia can then be directed to any other part of the body to include areas of surgery or childbirth, or areas of chronic pain such as occur in malignancies, causalgias and neuritis. Direct approach to numbness of a painful area is less easily accomplished than transfer from a normal unaffected extremity upon which the subject's imagination can work without distraction of pain in the site first to be made anesthetic. Since this form of pure hypno-analgesia may require a lengthy induction to adequate trance depth and rehearsal many times before being directly applicable to the clinical problem to be faced, it has less application in the anesthetist's practice than in that of the family physician or obstetrician who can arrange for several practice sessions with the patient.

In conclusion, I should like to say that for the first time hypnosis is receiving the approved study by the medical profession that this ancient form of medical art deserves. The years to come should reveal many more applications and fundamental facts about hypnotic phenomena than we can imagine today. We should, all of us, keep an open inquisitive mind concerning any technique that may help us to better meet the needs of our patients. In the practice of anesthesia, hypnosis teaches us much of

(Continued on page 56)

Coagulation Disturbances in the Operating Room

Rita Bristor, C.R.N.A. and Obie Hicks, M.D.*
Dayton, Ohio

The most obvious function of coagulation is the control of bleeding. Blood issuing from damaged tissues solidifies into an impervious and adherent mass effectively preventing further hemorrhage. Coagulation has been such a fascinating and complex problem to researchers that as many as 600 papers on this subject were written in 1953 and 1954. Research has led to the discovery of a new vitamin, recognition and treatment of a new range of hemorrhagic diathesis, introduction of the anticoagulant drugs and many subsidiary developments such as the synthetic resins and water repellent surfaces.

I would like first to give you a brief scheme of the coagulation picture. Not too long ago the classic theory of blood clotting consisted of only two phases—the conversion of prothrombin to thrombin and the conversion of fibrinogen to fibrin. Today three phases are recognized (Figure 1): First, the production of thromboplastin; this is formed from the interaction of platelets and several plasma factors and injury to tissue. The formation of thrombin depends upon the interaction of thromboplastin, calcium, the labile and stable factors, and finally, fibrin is formed from the interaction of thrombin and fibrinogen. One part or more in this scheme which does not function creates a coagulation disturbance.

The role of the platelet in blood clotting has become increasingly complex. In addition to the mechanical function of adhesiveness, platelets probably release several factors necessary for normal clotting. When a vessel is cut, the platelets become stuck as they flow past the wounded edges; they pile up and serotonin, a powerful vasoconstrictor from the platelets, escapes and constricts the vessel around the platelet plug. In small vessels this platelet plug is enough to accomplish hemostasis. The platelet is a source of serotonin and it has a heparin neutralizing factor, a prothrombin accelerator factor and thromboplastic co-factors. The normal platelet count is 200,000 to 500,000. Deficiency in the quality of the platelets occurs in the thrombopathic states such as thrombasthenia or von Willenbrand's disease. It also has been recognized in the myeloproliferative diseases such as granulocytic leukemia, thrombocytosis, and polycythemia vera. These abnormal states are frequently characterized by a family history of abnormal bleeding particularly associated with trauma or surgery. The most reliable diagnostic tests are a prolonged bleeding time with a nor-

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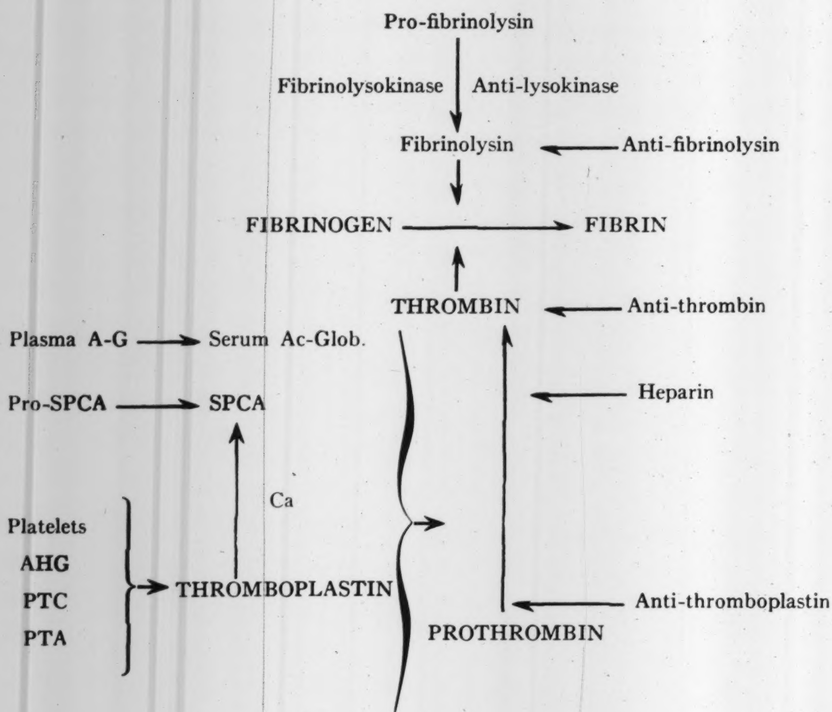
*V. A. Center, Dayton, Ohio.
Presented at the annual meeting, Ohio Association of Nurse Anesthetists, Columbus, April 6, 1960.

I. *Physiology of blood clotting.* (1)

A. Modern scheme of coagulation.



KEY:

Abbreviation	*Name*	*Synonyms*
AHG	Antihemophilic Globulin	Factor VIII.
PTA	Plasma Thromboplastin Antecedent	———
PTC	Plasma Thromboplastin Component	Christmas Factor, Factor IX.
Serum AC-Glob.	Serum Accelerator Globulin	Factor V, Labile Factor, Pro accelerin.
SPCA	Serum Prothrombin Conversion Accelerator	Stable Factor, Co-Factor, VII, Convertin

The three major phases of coagulation:

1. The production of thromboplastin
2. The conversion of prothrombin to thrombin
3. The conversion of fibrinogen to fibrin

Figure 1.

mal platelet count and poor clot retraction.

In Figure 2 are listed the various coagulation disturbances as regard to the factor, laboratory tests, etiology and treatment. These are usually diagnosed preoperatively by a carefully taken history and by laboratory tests. Occasionally one of these patients enters the operating room and a knowledge of proper treatment is of the utmost importance. Patients with definite coagulation disturbances may, from time to time, have "normal" diagnostic tests. Therefore, a single, isolated procedure may yield misleading information. In addition to those conditions listed on your sheet, we must take into consideration those patients who are on the anticoagulants or prothrombin depressants (Dicoumarol, Tromexan, Hedulin, etc.). These patients may bleed more readily from nutritional deficiencies of Vit. C and P than from the anticoagulant. This is due to vascular fragility. Heparin may cause some disturbance although its main function is antithrombotic. Heparin may prolong clotting time but this can be corrected by the administration of Protamine or Toludine blue. One must be aware of hypotensive effect of these substances. Protamine must be given in dilute solution, for example, 100 mg. of Protamine in 250 cc of saline. Heparin molecules carry a strong negative charge and can be antagonized by the positive charge which is carried by such substances as Protamine and Toludine blue.

Deficiency of prothrombin or a depressed prothrombin is rarely congenital but acquired in diseases of the liver and biliary system. This condition is seen in biliary and high intestinal fistulas, dysentery and preoperative sterilization of the colon by floracidal agents. Theoretically, the floracidal agents destroy the Vitamin K forming organisms which normally reside in the colon. Excessive use of salicylates may also cause a depressed prothrombin. I have briefly discussed the coagulation picture and some related common preoperative coagulation disturbances. I would now like to discuss the disturbances which may arise during surgery and anesthesia.

Coagulation disturbances resulting from the administration of bank blood are of two kinds, those associated with massive transfusions and those associated with incompatible transfusion reactions. Massive blood transfusions given rapidly produce a marked fall in platelets due to the dilution of the patient's platelets for bank or stored blood is invariably deficient in platelets, as well as AHG or anti hemophilic globulin and labile factor. The citrate in stored blood is often mentioned as a cause of bleeding disturbances but Zucker, in a series of 77 patients, was unable to demonstrate any direct correlation between plasma citric acid levels and oozing. On the other hand, citrate may produce cardiovascular changes including cardiac irregularities, marked pulmonary hypertension and myocardial depression. These changes are particularly noted or marked in patients with shock, cardiac disease, severe anemia and liver damage. The deleterious effects of citrate are partially neutralized by intravenous calcium gluconate. Extracorporeal circulation involving, as it does, the use of heparin and large quantities of supplemental blood to fill the equipment might lead one to suppose that bleeding tendencies would be frequently encountered; however, this

PREOPERATIVE COAGULATION DISTURBANCES

Factor	Laboratory Tests	Etiology	Treatment
DEFICIENCY OF: a. (Platelets thrombocytopenia)	1. Prolonged bleeding time 2. Increased Capillary fragility 3. Poor clot retraction 4. Poor prothrombin consumption	1. Idiopathic or primary (cause unknown) 2. Secondary—(a) any condition where bone marrow is destroyed (b) massive transfusion	1. Adrenal steroids 2. Fresh blood 3. Splenectomy in primary thrombocytopenia 4. Platelet transfusion
b. AHG (anti hemophilic globulin) or (Hemophilia)	1. Prolonged clotting time 2. Poor prothrombin consumption 3. Normal prothrombin time	1. Hereditary or congenital	1. Fresh blood 2. Fresh plasma
c. PTC (plasma thromboplastin component)	1. Same as hemophilia; usually a milder disease	1. Hereditary or congenital	1. Fresh blood 2. Fresh serum
d. PTA (plasma thromboplastin antecedent)	1. Slightly prolonged clotting time 2. Poor prothrombin consumption	1. Hereditary or congenital	1. Fresh plasma 2. Fresh serum
e. Prothrombin	1. Prolonged one-stage prothrombin time	1. Biliary obstruction 2. Liver diseases 3. Sprue 4. Hemorrhagic diseases of the newborn	1. Whole blood 2. Plasma 3. Vit. K.
f. Plasma Accelerator Globulin (Factor V or Pro Accelerin or Labile Factor)	1. Prolonged bleeding time 2. Prolonged prothrombin time 3. Poor prothrombin consumption 4. Not corrected by normal serum or oxalated aged plasma	1. Severe liver disease 2. Advanced carcinoma 3. Congenital	1. Fresh blood 2. Fresh plasma
g. Serum Prothrombin conversion accelerator (Factor VII or Proconvertin or stable Factor)	1. Prolonged clotting time 2. Prolonged prothrombin time 3. Corrected by normal plasma and serum	1. Obstructive jaundice 2. Those on Dicoumarin anti-coagulants 3. Congenital	1. Whole blood 2. Plasma 3. Serum
h. Fibrinogen	1. Prolonged clotting time 2. Prolonged prothrombin time 3. Low plasma fibrinogen level	1. Congenital (rare) 2. Acquired as in a. obstetric complications b. liver damage due to chloroform poisoning c. carcinoma	1. Fibrinogen 2. Whole blood 3. Plasma
EXCESS OF: a. Fibrinolysins	1. Rapid clot lysis	1. Anxiety or stress states 2. Burns 3. Carcinoma	1. Fresh blood 2. Fibrinogen
b. Heparin-like substances	1. Abnormal "mixture" test 2. Abnormal protamine test	1. Hemoclastic reactions (Transfusion reactions)	1. Protamine 2. Polybrene

Figure 2

has not been found to be the case except in patients with uremia or congenital malformation of the heart with coincident polycythemia.

In some individuals, after 1,000 cc of Dextran has been given, oozing will be noted. Alteration of the platelets is the probable cause since the Dextran molecules form a coating on the platelets and prevent their func-

tioning properly to plug the cut end of the vessel. The other plasma substitutes such as gelatin, serum albumin, PVP or polyvinylpyrrolidone do not cause prolongation of bleeding time but obscure the blood picture for a great length of time. When a bleeding tendency develops following multiple transfusions, it is thought to be related to the activity of circulating fibrinolysins. These enzymes normally present in the blood in an inactive form are activated by a series of events of which shock, trauma and even bleeding itself may be listed.

A coagulation disturbance may result from an incompatible transfusion, either errors in crossmatching or the administration of the wrong blood. Statistically one death in every 1,000 to 3,000 transfusions has been observed.

Disturbances of the hemostatic system has been noted in patients under hypothermia especially children but the condition readily corrected itself upon elevation of body temperature.

Hypofibrinogenemia is a clinical problem associated primarily with obstetrical complications such as abruptio placentae, amnionic fluid emboli and retention of dead fetus. Frequently severe hypofibrinogenemia develops within six hours after onset of symptoms of abruptio placentae. This is not a rare condition as is usually suggested but occurs with a frequency of 1 in 544 cases, as observed by Greenhill.

When fibrinolysins become activated, coagulation is greatly impaired. As stated previously, these enzymes are in an inactive form in the blood but may become activated by a tissue substance called "kinases." These kinases are found in abundance in the lung, uterus and pancreas. Activated fibrinolysins produce a rapid digestion of fibrin and fibrin clots. Under these circumstances the liver cannot produce fibrinogen rapidly enough to counteract the loss of fibrin, therefore, fibrinogen must be given. Fibrinolysis is seen most frequently in thoracic surgery, gynecologic surgery and pancreatic surgery. Fibrinolysis may occur in cases of carcinoma of the stomach, prostate, pancreas and kidney. These fibrinolysins may also become activated by bacterial extracts as in the case of infection and also by anxiety or stress states.

Prompt diagnosis and prompt therapy are of the utmost importance when a coagulation disturbance in the operating room develops. For the surgeon, it is a most trying period as he is plagued with oozing from all cut surfaces. The anesthetist may observe a narrowing of the pulse pressure, tachypnea, and poor peripheral color. It is desirable to establish a specific diagnosis in each case but very few hospitals are prepared to carry out this difficult task on an emergency basis. Rapid, reliable tests, however, can be done in the operating room. The following procedure may be utilized. Twenty-five cc's of the patient's blood and 10 cc's of control blood from a healthy volunteer should be drawn simultaneously. Eleven test tubes are set up, two of which should be citrated. To obtain a control clotting time two cc's of control blood is placed in each of three test tubes. The first tube is tilted every minute until the blood clots and can be inverted. The second and third tubes are tilted in similar fashion in sequence. The total time required for the third tube to clot is recorded as the clotting time. A clotting time of over 20 minutes is definitely abnormal. This is the Lee and White test.

The patient's clotting time is similarly determined by this procedure and compared with the control. A "mixture" test for the presence of abnormal anticoagulant factors such as dicoumarin or heparin should be performed. Two cc's of the patient's blood is mixed with two cc's of the control's blood. If the blood does not clot (and the Lee and White clotting time is prolonged), an abnormal anticoagulant factor probably is present. Two cc's of the patient's blood is then mixed with Thrombin (available commercially as Fibrindex, Ortho.). A failure to clot or a deficient clot formation indicates deficiency of fibrinogen. If the clot is thin and fragile, hypofibrinogenemia is suggested. To determine if fibrinolysins are activated, the patient's clotted blood is observed and the diagnosis is established if the clot deteriorates. The remainder of the patient's blood is put into the two citrated test tubes and sent to the hematology laboratory for the following emergency tests: Prothrombin time, platelet count, prothrombin consumption, Coomb's test, evidence of hemolysis, fibrinolysis study, Protamine titration and fibrinogen level.

Treatment is necessary whenever continued bleeding is severe enough to require rapid and repeated blood transfusions. Prompt and appropriate management is essential as time is a decisive factor. Multiple defects frequently develop if the clotting disturbance is not reversed or corrected. Stop all blood infusions and check immediately for gross incompatibility, later for fibrinolysin activity. Alert the blood bank and have them cross-match at least 2,500 cc. of FRESH blood. This can be done by procuring "walking donors." When fibrinolysin activity or fibrinogen deficiency is established, FRESH blood is given to prevent shock; also 200 mg. hydrocortisone IV, and 3-5 grams of Fibrinogen IV. This may be repeated in 1-2 gram increments if necessary. Fibrinogen should not be used indiscriminately because of the danger of transmitting serum hepatitis; an estimated 20 to 25% of people given fibrinogen will develop serum hepatitis. But it must be remembered that it is better to have a live patient with serum hepatitis than a dead one. In the hyper-heparinemia or abnormal anticoagulant states, FRESH blood and 200 mg. of hydrocortisone IV are given to prevent shock and Protamine sulfate in dilution for the coagulating factor. In certain cases the defects are multiple, and diagnostic tests may demonstrate minimal abnormalities. The keystone of therapy is FRESH blood augmented by hydrocortisone and fibrinogen where indicated. Vitamin K-1 oxide may augment the therapy but is not a definite treatment in the majority of cases. Oxycel, Gelfoam, topical thrombin, and Adrenosem are of little or no value during these states.

The old quotation, "An ounce of prevention is worth a pound of cure", might well apply to the nurse anesthetist who checks the patient before administering an anesthetic. If the patient has a prolonged prothrombin time due to biliary obstruction or liver disease, he or she must be prepared preoperatively with Vitamin K active substances. Persons with thrombocytopenia who have a platelet count below 50,000 are in danger. These patients should be prepared with steroid therapy and fresh blood utilizing special collecting equipment or siliconized bottles to preserve the platelets. Prothrombin time below 30% (of control) is potentially hazardous

to the patient who has been on anticoagulants. Fibrinogen levels below 150 mgms. are potentially dangerous. Alert the blood bank when patients who have a history of blood transfusion reactions (of all types) require bank blood. Avoid errors in blood transfusions by being certain that the cross-match sample has been obtained from the correct patient and the same patient receives the subsequent matched bank blood. The blood bank should use the Coomb's test whenever possible. In cases in which the anticipated blood replacement is over 2,500 cc, request only FRESH blood. Replace blood slowly whenever possible. It is probably sound therapy to give one gram calcium gluconate for each three units of blood administered, especially if the blood is administered rapidly. Do not put it in the blood bottles.

The dangers of massive oozing must be met with prompt and appropriate management if patients are to be spared the pernicious effects of rapid blood loss during surgery and in the immediate postoperative period. No better preparation for this task can be made than the acquisition of a thorough knowledge of the physiology of clotting and hemostasis. Having acquired this knowledge, the diagnosis, diagnostic procedures and treatment virtually suggest themselves to the discerning anesthetist.

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Insurance

AANA ANNOUNCES 1961 ENROLLMENT CAMPAIGN

Exceptional opportunity for members

CHICAGO—January 4, 1961—The National Headquarters of the American Association of Nurse Anesthetists today announced a special enrollment campaign in the exclusive "Income Protection" Plan.

With the assistance of the Official Insurance Consultants of the Association, Maginnis & Associates, Inc., an invitation will be mailed to each member to urge her to take full advantage of her membership in the Association, by participating in this program.

AANA ANNOUNCES NEW BENEFITS

Now offering 2 year Sickness and Lifetime Accident Benefits

SAN FRANCISCO, CALIFORNIA—The American Association of Nurse Anesthetists, at it's annual convention, announced today that the benefits in the Exclusive "Income Protection" Program, have been drastically increased.

The member may now be protected for a period of 2 years indemnity in the event of illness instead of the previous 1 year period. This dramatic increase is in addition to the fact that the member has lifetime protection in the event of an accident.

This is another in the long line of improvements in our "Income Disability" Program made possible by increased participation in the plan.

CLAIMS PAID IN EVERY STATE

SAN FRANCISCO, CALIFORNIA—The AANA today released the fact that AANA members in nearly every state in the United States have collected benefits from the exclusive "Income Protection" Program.

The official consultants, Maginnis & Associates, Inc., made public the fact that not only have members in every state, enrolled in their program, but that claims have been paid in every state, thus demonstrating the fact that the need for this excellent program is universal.

AANA Plan Has Broadest Protection

SAN FRANCISCO, CALIFORNIA—The AANA announced today that with the dramatic increase in sickness benefits in the exclusive "Income Protection" Program, (AT NO INCREASE IN PREMIUM), this program now offers the broadest protection available anywhere.

It was explained that increased participation in the program made these increases possible and that as this participation increases even further that additional increases will become possible.

With this thought in mind, the National Headquarters of the AANA plans an extensive Enrollment Campaign for 1961 and has asked Maginnis & Associates, Inc., to make an attempt to contact every member of the Association and explain this benefit of membership to her.

6th SUCCESSFUL YEAR

Adopted by Board of Trustees in September, 1955

1. In September of 1955 the Board of Trustees unanimously adopted an "Income Protection" program which was designed exclusively for the members of the American Association of Nurse Anesthetists.

2. When adopted, the benefits available to the members were 1 year for sickness and 5 years for accident. These benefits were subsequently increased to 1 year sickness and lifetime accident and NOW, another dramatic increase in benefits. The member is now protected for two years sickness and lifetime accident.

"The Journal"

Extra! *Extra!*

1961 ENROLLMENT CAMPAIGN

in the

A.A.N.A. EXCLUSIVE

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Two Years Sickness Benefits!

Lifetime Accident Benefits!

The lowest possible rate for the highest type of Protection. It is your privilege to enroll as an active member of A.A.N.A. Full information and application is being mailed to every member.

**Protect your income, not only in 1961—
but for the years to come through your—**

A.A.N.A. Group Income Protection Plan.

Hospital Safety

Harriet L. Aberg, C.R.N.A.

Is it safe to take flashlight pictures in the delivery rooms or operating rooms while ether is being given, either open drop or closed methods?

The Code for use of Flammable Anesthetics is quite specific about this, "Photographic equipment used in hazardous locations shall comply with provision of Article 248 (concerning portable electrical equipment) to prevent ignition of flammable gases. Lamps used above the hazardous location shall be suitably enclosed to prevent sparks and hot particles falling into the hazardous area. Photoflash and photoflood lamps which are not suitably enclosed shall not be used within an anesthetizing location. Neither flash tubes nor their auxiliary equipment shall be used within the hazardous location. Flashtube operation may be accompanied by sparking at switches, relays and socket contacts, and by corona discharge of flashovers from high voltage circuits."

For instance, if a photographer is standing above the anesthetist or anesthetic apparatus so the photographic equipment is above the five foot level, the flash bulb could shatter and hot sparks could fall into the area where the ether or cyclopropane is of flammable proportions. Therefore the flash bulb and any other part of the mechanism which could drop a hot spark must be protected with a self containing shield, so as to prevent the falling of hot particles.

Photoflood lamps also must be guarded or screened for the same reason, and the cord used must comply with the code and be continuous and without switches from appliance to plug. Also, "The temperature of incandescent lamps of greater power than 150 watts is considered to be too high for safe operation."

Is it better to wear conductive soled shoes or conductive booties over your shoes?

Either method of achieving conductivity is acceptable as long as they are tested on the wearer to be sure conductivity has been achieved. The wearing of over shoe devices is often related to operating room technique for the purpose of eliminating or lowering postoperative infections.

Miss Aberg is A.A.N.A.'s representative on the N.F.P.A. Committee on Hospital Operating Rooms.

Any questions pertaining to hospital safety may be directed to the Executive Office Answers will be included in this section in future issues.

Legislation

Emanuel Hayt, LLB., Counsel A.A.N.A.

Patient Entitled to Prove Burn was Result of Administration of Anesthetic

Suit was brought to recover damages for injuries sustained allegedly as the result of malpractice. In the course of being delivered of a child in the defendant hospital, plaintiff was alleged to have sustained a facial inflammation or rash in the nature of a burn as the result of negligence in the administration of an anesthetic. The pre-trial order stated plaintiff's factual position as follows: The injury resulted from the improper attachment of the mask to her face, from the failure of defendants to inspect the anesthetic machine and mask, and the failure to have made proper tests upon the patient prior to the administration of the anesthetic. In the opening statement to the jury, plaintiff's counsel failed to allege specific acts of negligence on the part of defendants, professed no knowledge as to said negligence and proceeded on the theory of res ipsa loquitur. The trial court granted defendants' motion for involuntary dismissal, stating that res ipsa loquitur did not apply in this instance and that a showing of express negligence on the part of defendants was required.

This court stated that, in an action for malpractice against a physician, the plaintiff is ordinarily required to establish that defendant's treatment or care fell below the standard established for the indicated condition of the patient, and that the standard of care must be proven by expert medical testimony. But where the asserted negligence consists of conduct so obviously wanting in reasonable medical skill and prudence that it may be so adjudged by a layman, expert testimony as to the standard offended is unnecessary. After stating this background as to the substantive negligence principles implicated, the court turned to the procedural point respecting the sufficiency of an opening. The purpose of an opening is to do no more than inform the jury in general way of the nature of the action and the basic factual hypothesis projected. The court was of the opinion that this case presented considerations bespeaking maximum tolerance for the plaintiff's position, viz., the fact of the patient's unconsciousness when the alleged negligent acts took place and the consequent pooling of all direct evidence of the occurrences into hostile hands, as well as the commonly known difficulty of obtaining expert proofs in support of a malpractice claim. The court, because of the particular circumstances, took into account plaintiff's filed depositions which contained admissions by defendant that she had suffered a burn as the result of the application of the anesthetic and which described the treatments given plaintiff for the burn by said defendant hospital. The court concluded that plaintiff was entitled

to submit her evidence at trial. The judgment of the court below was reversed.

(Terhune v. Margaret Hague, Maternity Hospital et al., 11CCH Neg. Cases 2d 1025-N. J.)

Patient's Case Dismissed for Failure to Prove Special Attention Required After Use of Drug

The appellee-Lloyd was an intern in the hospital, and he assumed charge of appellant's case upon the latter's arrival in the ward. Part of the treatment included the intravenous administration of a drug known as Levophed in a glucose solution. This drug is a blood vessel constrictor utilized to increase the blood pressure in cases of shock. About 5:45 p.m., he was removed to the men's medical ward and the same treatment was continued. He was also placed in an oxygen tent.

The original administration of the drug was into the arm of the patient but this was discontinued about midnight on January 5th, when the patient manifested a satisfactory response by regaining consciousness, normal pulse and blood pressure. About six o'clock the following morning, the patient's condition appeared to be deteriorating. He again lost consciousness and the administration of drug was resumed. This time, however, the collapse of his circulatory system rendered injection through the arm impossible, necessitating administration of the drug through a cutdown to a vein in the lower right leg, where a soft polyethylene catheter was inserted approximately six to eight inches into the vein. This cutdown was performed about seven-thirty o'clock a.m., by a medical member of the staff assisted by Dr. Lloyd.

The administration of the drug continued through the day of January 6th. Dr. Lloyd attempted to slow or discontinue the administration of the drug on some occasions, but each time the patient's response indicated the necessity of its continuance.

About five o'clock p.m. of January 6th, Dr. Lloyd went off duty and the intern then in charge was briefed as to appellant's condition. About six-thirty o'clock p.m., according to the hospital chart, a nurse noticed that the intravenous flow was slowed and the vein was becoming edematous. The intern was called and he observed that the infusion was infiltrating into the tissue surrounding the vein. He immediately (about seven o'clock p.m., according to the chart) shut off the administration of the drug, and a substituted course of treatment was instituted to support that already given. This charted data is a variance with the testimony of the appellant's wife, who testified (with some uncertainty as to the exact date) that it was she who first noticed a blister on her husband's leg in the area of the injection site about three-thirty o'clock in the afternoon; that she called it to the attention of the only nurse in attendance in the ward at the time; and, that a doctor did not appear to provide attention for a period of one-half hour to one hour's time.

On the early morning of January 7th, the patient regained consciousness. The treatment saved his life, but, as a result of the infiltration of the Levophed into the tissue, a blister formed and skin and tissue were burned. Surgery was necessary, consisting of a cutting away of the tissue, scraping of the bone, and grafting of skin onto the leg at the location of the wound. Months of disability followed.

5

A medical expert was called by the plaintiff-appellant. He testified that a person receiving Levophed should have constant attention by someone whose duty it would be to observe infiltration, blood pressure and the patient's general condition. He was asked in the form of a hypothetical question, containing the essential details of Dr. Lloyd's testimony, whether or not the care given appellant amounted to "constant attention" and he answered that, in his opinion, the appellant received "constant attention" and that the practice followed in this case was good medical practice.

In order to sustain this action of alleged malpractice, it was incumbent upon the plaintiff to prove that the defendants did not exercise the care and judgment required of reasonable men in like circumstances.

There isn't a scintilla of evidence in the record to establish how the drug escaped from the vein into the tissue. The testimony fails even to hint that any act of omission or commission on the part of either defendant caused this to happen. The claim is completely devoid of merit.

(Grantham v. Goetz et ano., 11 CCH Neg. Cases 2d 1007-Pa.)

Jury Should Have Decided Negligence of Nurses in Patient's Fall From Bed

Plaintiff alleged that defendant was guilty of negligence in the care afforded him because its employees failed to provide adequate and necessary safeguards for his protection; that as a result he fell from the hospital bed to the floor and suffered a fracture of the right shoulder for which he sought damages.

Plaintiff received his special treatments at St. Mary's Hospital from Dr. George M. Cowan, his own doctor who was then a member of the hospital staff specializing in the field of psychiatry and neurology. Plaintiff was given a series of electric shock treatments as part of the treatment prescribed for his mental illness. Prior to each electric shock treatment, he was administered sodium amytal which had a sedative effect usually inducing sleep.

Dr. Cowan testified that he does not himself assign the nurses to watch over the patient after treatment has been given; that this is up to the head nurse or her assistant at the hospital. He gives the treatments in the patient's room with the assistance of nurses or nurses' aides, who are employees of the hospital.

Plaintiff here was attended daily by defendant's nurses and nurses' aides, who not only had access to the hospital record but also had their personal observations of plaintiff's conduct, irrational and otherwise. Certainly defendant hospital is charged with knowledge thus obtained by its trained personnel and written into the hospital record by them and by the doctor and internes attending the plaintiff. The defendant, therefore, was charged with knowing the probability that plaintiff, due to his confused state of mind, might cause harm or injury to himself.

Plaintiff's physician here did no more than administer the technical part of the treatments as the evidence clearly indicates and was not made a party to the action. According to the doctor's own statements he depended upon the hospital and its staff of nurses to take over completely after he had administered the shock treatment.

The decisions of this state (Min-

(Continued on page 55)

Abstracts

Woolley, Emma J. and Vandam, L. D.: Neurological sequelae of brachial plexus nerve block. Ann. Surg. 149: 53-60 (Jan.) 1959.

"The immediate complications of brachial plexus nerve injection performed via the supraclavicular route have been described sufficiently in many papers. There is, however, little recognition of the fact that delayed sequelae may ensue from damage to nerves. . . .

"During the years 1955-1956, 106 brachial plexus nerve blocks were provided for operations on the upper extremity at the Peter Bent Brigham Hospital. . . . One or two years after operation letters of inquiry were sent to all these patients. . . . Only 53 (50%) of the patients replied to the questionnaire. . . . Of those who responded 29 had no complaints and would have submitted to this type of anesthesia again. Six others had no residual complaints but would not choose brachial plexus anesthesia again because of discomfort during injection and during the operation.

"In three of these supplementation with general anesthesia was required because of inadequate pain relief. Seven patients described residual soreness or vague paresthesias but further inquiry revealed that these complaints were transient. Four patients had persistent neurological symptoms of significant duration. Two of these cases . . . had been called to our attention by their surgeons. One other . . . had been discovered by us during routine postoperative rounds. . . .

"An atraumatic technic with the use of small gauge needles and avoidance of hematoma formation must be the goal in the performance of brachial plexus nerve block. Patients should be chosen for this type of anesthesia and carefully prepared with sedatives so that the experience of nerve injection is not disagreeable and recollection of the procedure not too vivid. Reputable local anesthetics should be used with careful attention to sterility. The concentration and volume of local anesthetic employed must be suitable for the surgical procedure planned to avoid inadequate anesthesia or anesthesia too brief for operation."

Berry, J. N., Thompson, H. K., Jr., Miller, Edmond and McIntosh, H. D.: Changes in cardiac output, stroke volume, and central nervous pressure induced by atropine in man. Am. Heart J. 58: 204-213 (Aug.) 1959.

"Atropine is frequently used in the cardiovascular laboratory as a simple and effective means of increasing the heart rate. Despite previous studies it is not generally appreciated that the intravenous injection of sufficient atropine to produce tachycardia (1 mg. or more) may also produce an increase in cardiac output and a fall in central venous pressure. The genesis of these changes is unknown. The present study was designed to investigate the nature of the hemodynamic

changes associated with atropinization of normal recumbent subjects. . . .

"Central venous injection of 2 mg. of atropine sulfate in 22 recumbent subjects produced a tachycardia associated with an increase in cardiac output, a fall in stroke volume, a decrease in mean central venous pressure, and a slight rise in mean arterial pressure, when observations were made from 3 to 25 minutes after injection. In five normal subjects the increase in cardiac output was greater during the first 3 minutes after atropine than from 4 to 14 minutes after the injection, although the pulse rate remained essentially unchanged. Thus, an absolute fall in stroke volume occurred later than 3 minutes after the injection of atropine."

Covino, B. G., Margolis, N. and D'Amato, H. E.: Effect of various drugs on spontaneous and surgically induced ventricular fibrillation in hypothermia. Am. Heart J. 58: 750-754 (Nov.) 1959.

"The present investigation is concerned with evaluating the effectiveness of three pharmacologic agents, Ambonestyl, quinidine, and mephentermine, as antifibrillary drugs in hypothermia with and without the added complication of cardiac surgery. . . . Apparently healthy mongrel dogs of both sexes . . . were anesthetized with pentobarbital sodium (30 mg./Kg. intravenously), supplemented as needed to suppress shivering. . . .

"Mephentermine in a dose of 3 mg./Kg. significantly reduced the frequency of spontaneous ventricular fibrillation, whereas Ambonestyl and

quinidine were not effective. When combined with either Ambonestyl or quinidine, mephentermine exerted the same antifibrillary effect. Surgically induced ventricular fibrillation in hypothermia was significantly reduced by quinidine (12 mg./Kg.) but not by Ambonestyl or mephentermine. The results indicate that the two situations (spontaneous and surgically induced fibrillation in hypothermia) are not entirely similar, that prevention of one does not imply prevention of the other, and that factors predisposing the heart to fibrillation are different in the two conditions."

Dale, W. A. and Schwartz, S. I.: Rebreathing tube for prophylaxis and treatment of atelectasis. Am. J. Surg. 98: 20-24 (July) 1959.

"The prevalence and importance of pulmonary complications are well recognized today by both surgeons and anesthesiologists. . . . Hyperventilation with its attendant alveolar distention and stimulation of coughing is an important factor in the prevention and treatment of pulmonary atelectasis.

"A light cardboard tube of 1,000 cc. volume with a plastic mouthpiece has been developed, which by elevating the alveolar carbon dioxide tension stimulates such hyperventilation both in normal personnel and in patients before and after operation. Studies indicate the parallel changes in alveolar carbon dioxide tension and tidal volume which reach an equilibrium after approximately three minutes of rebreathing through the dead space tube. Some decrease in alveolar oxygen tension can be prevented by delivery of oxygen into the end of the rebreathing tube if necessary. Routine use of this tube in patients postoperatively in the past year and a half has been useful in preventing and treating pulmonary complications."

Clauss, R. H., Junker, R. D., Browning, L. D. and MacFee, W. F.: Hypothermia for portacaval shunts. Ann. Surg. 150: 99-103 (July) 1959.

"Cirrhosis of the liver is one of the ten leading causes of death in the United States. It is fourth in the age group of 45 to 64 years. . . . Ten patients were operated upon who had intrahepatic portal venous obstruction secondary to alcoholic or postinfectious cirrhosis. . . .

"In the absence of contraindications to operation (v.i.), portacaval shunt was performed within a few hours of admission. The premedication employed was that for hypothermia, namely, 50 milligrams of chlorpromazine intramuscularly two hours before induction, and 0.4 milligrams of atropine one hour before anesthesia. Pentothal or cyclopropane and curare-like agents were used. Immersion hypothermia was begun within 15 minutes of inducing anesthesia. . . .

"Ten consecutive patients who were operated upon between August 1955 and December 1957 survived operation, and nine were discharged from the hospital. . . . There has been no instance of bleeding after shunt. There was one death from liver failure two and one-half months after operation in a poor risk patient."

Book Reviews

Electroencephalography in Anesthesiology. By Albert Faulconer, Jr., M.D., M.S.; Anesthesiology Consultant, Section of Anesthesiology, Mayo Clinic; Associate Professor of Anesthesiology and Physiology, Mayo Foundation; Graduate School, University of Minnesota, and Reginald G. Bickford, M.B., Ch.B., M.R.C.P., Consultant, Section of Physiology, Mayo Clinic; Professor of Physiology, Mayo Foundation, Graduate School, University of Minnesota. Charles C Thomas, Publisher, Springfield. Cloth. 90 pages. American Lecture Series. 1960. $4.75.

The authors have attempted to "analyze, correlate and outline in a single publication some of the information in this growing mass of source material" on the subject of electroencephalography in relation to anesthesiology. In an attractively bound hard cover book, one of the American Lecture Series, they have succeeded in this goal. Anesthetists will be delighted with this concise presentation of electroencephalographic changes, the instrumentation, anesthetic agents, pathophysiologic changes and servoanesthesia. A list of 95 references follows the text. The book is not indexed but the table of contents is detailed.

Simplified Drugs and Solutions for Nurses, Including Arithmetic. By Minette Nast, R.N., M.S., Member of Faculty, Hospital for Special Surgery, New York, N. Y. C. V. Mosby Company, St. Louis. Paper. 72 pages. 2nd ed. $1.50.

Printed in offset from typed copy and simplified to cover the various groups of nurses who will be required to understand drugs and solutions, the book is predominantly an exercise in arithmetic. In computing of drugs and the preparation of solutions being used, it has illustrations of the arithmetical principles involved. The book should be of interest to anesthetists who are interested in reviewing the arithmetic used in drugs and solutions.

Essays on the First Hundred Years of Anaesthesia. By W. Stanley Sykes, M.B.E., M.B., B.Chir. (Cantab.), D.A.; Late Anaesthetist to the General Infirmary at Leeds, to the Hospital for Women and St James' Hospital, Leeds, to the Leeds Dental Hospital, to the Halifax Royal Infirmary and to the Dewsbury General Hospital. E. & S. Livingstone Ltd., Teviot Place, Edinburgh. Exclusive U.S. agents: Williams & Wilkins Co., Baltimore. Cloth. 171 pages, illustrated. Indexed. 1960. $7.00.

These essays are not just another history. In his preface, the author says, "The value of history is that it may enable us to avoid making too often the mistakes that others have already made. But in order to avoid them it is essential to know about them. That is why history is of practical value to the anaesthetist."

Beginning with an entirely delightful and profusely illustrated preface, the author has followed little known paths in the history of his specialty, sometimes wandering into byways where "name, place and date" historians would disdain to follow.

No person interested in anesthesia can afford to forego the pleasure of this unique series of essays, not only because of the factual information.

but because of the delightful excursions into the past. If for no other reason, the titles of the chapters would intrigue the reader — "The Effect of Cantharides on the Hedgehog," "An Obstetrical Scylla and Charybdis," or "Victoria and Mr. Wakley," and "Stupidities."

Fundamentals of Nerve Blocking. By Vincent J. Collins, M.S., M.D.; Associate Professor of Anesthesiology, New York University Medical Center and Anesthesiologist, Bellevue Hospital Center. Lea & Febiger, Philadelphia. Cloth. 354 pages, 144 illustrations. Indexed. 1960. $9.50

The author has prepared this book to "record in part the material and technics presented in the regional course at New York University Medical Center, and more importantly, to record in brief the far reaching contributions and accomplishments of Dr. E. A. Rovenstine." The principles and problems of nerve blocking and brief details of the regional technics are the main divisions of the book. To anesthetists who must attend patients who have nerve blocks, the book will be invaluable in explaining the technics, the agents and the principles governing these blocks. Each chapter is followed by a list of references.

Neurological and Neurosurgical Nursing. By C. G. de Gutierrez-Mahoney, M.D.; Director of the Neurological Division and Neurosurgeon-in-Chief, St. Vincent's Hospital New York, N. Y.; Clinical Professor of Neurosurgery, New York University Post-Graduate Medical School; National Consultant Neurosurgeon, United States Air Force, and Esta Carini, R.N., Ph.D.; Chief, Mental Health Nursing Services, State of Connecticut Department of Mental Health, Hartford, Conn.; formerly Department Head of the Neurological Division and Instructor of Neurological and Neurosurgical Nursing, St. Vincent's Hospital, New York, N. Y. C. V. Mosby Company, St. Louis. Cloth. 413 pages, 95 illustrations. Indexed. 3rd ed. 1960. $6.50.

With the effect of ataractic drugs and neuroradiology in the fields of neurology and neurological surgery, this edition had been prepared only four years after the second edition. Nurse anesthetists will find valuable information not only in the chapters on the diagnostic study of the patient, but also in positioning, surgical technics and the treatments of psychiatric patients. References follow each chapter and in addition an appendix gives supplementary references and a glossary adds to the value of the book for teachers.

Nurses Can Give and Teach Rehabilitation. By Mildred J. Allgire, R.N., R.P.T., M.A.; Director, Nursing and Therapy Services, and Ruth R. Denney, R.N., R.P.T., B.S.; Consultant, Nursing and Physical Therapy Division of Services for Crippled Children, Indiana State Department of Public Welfare, Indianapolis, Indiana. Springer Publishing Company, Inc., New York. Paper. 61 pages, illustrated. 1960. $1.25.

The title of this book would seem to indicate that there would be little connection between its contents and the work of nurse anesthetists. However, with consideration for the many anesthetists who are working in hospitals for crippled children, we believe that this merits inclusion in our journal. The role of the nurse in rehabilitation extends not only to the physiotherapists but to each person who has any part in the care of the disabled. This is a simply outlined and clearly illustrated teaching manual that will be of interest to anesthetists, especially those who work with patients who require long time rehabilitation.

Classified Advertisements

IMMEDIATE OPENING for Nurse Anesthetist, 230 bed hospital, liberal Personnel Policies, paid vacation and sick leave, starting salary $550 mo. Reply: Box M-77, Journal American Association of Nurse Anesthetists, Prudential Plaza, Suite 3010, Chicago 1, Illinois.

NURSE ANESTHETISTS to complete staff of three for 85 adult bed hospital. Situated midway on Pennsylvania Turnpike between Pittsburgh and Harrisburg. Famous Resort Area. Salary open, liberal Personnel Policies. Apply Miss M. Valigorsky, C.R.N.A., Memorial Hospital of Bedford County or telephone Collect — Bedford 655. Route 1, Everett, Pa.

NURSE ANESTHETIST — 500 bed hospital. Anesthesia Department consists of three M.D. and thirteen Nurse Anesthetists. Write to Medical Director, Crawford W. Long Hospital, Atlanta, Georgia.

NURSE ANESTHETISTS (2) needed for new 150 bed accredited General Hospital, 25 miles west of Detroit, Michigan. Starting salary $500.00 per month for forty (40) hour week. Full coverage for both surgical and obstetrical departments. Remuneration for surgical call. Doctors are excellent to work with. D. Kehler, Chief Anesthetist, Annapolis Hospital, Wayne, Michigan.

NURSE ANESTHETIST: 364 bed General Hospital being enlarged to 500 beds. Want to enlarge present staff of one M.D. plus 7 Anesthetists. Salary from $400 to $500 month plus extra bonus payment per case on call duty and retirement and sickness benefits. New air conditioned Operating Rooms. Apply Chief, Department of Anesthesia, York Hospital, York, Pa.

NURSE ANESTHETISTS: All types of Anesthesia and Surgery. University Hospital, no night call, no Obstetrics, no weekends. Apply: D. C. Weaver, M.D., Grace New Haven Community Hospital, P. O. Box 1001, New Haven, Connecticut.

YOU WILL LIKE US — Here you will find friendliness among your colleagues and a cooperative atmosphere among both Medical Staff and Administration in a beautifully equipped, new 208 bed general service hospital. This is a pleasant resort area in historic, yet modern, Tidewater Virginia. Offer us your skill, interest, and dependability; we offer you, in addition to an excellent salary, pleasant and permanent employment, "on call" pay, sick leave, paid holidays and vacations, and your meals free while "on call". Write or call Administrator, Dixie Hospital, Hampton, Va.

REGISTERED NURSE ANESTHETISTS: 690 bed hospital, primarily surgical. Integral part of developing 236 acre Detroit Medical Center. Emergency surgery only on Saturdays. Salary commensurate with qualifications. Excellent personnel policies. Write or call Personnel Director, Harper Hospital, Detroit 1, Michigan.

REGISTERED NURSE ANESTHETIST. 67 bed, fully accredited, General Hospital. Salary open. Four weeks paid vacation. 14 sick days allowed. 7 paid holidays allowed. To work opposite and take alternating call with one other Anesthetist already employed. Muncy Valley Hospital, Muncy, Pa.

WANTED: Registered Nurse Anesthetist for completely new 150 bed air conditioned hospital. Vacation, sick leave, Social Security. 1 hour drive from Atlantic Ocean beaches and Norfolk, Va. Pleasant working conditions. Write or call Mrs. Mattie A. Foster, C.R.N.A., Albemarle Hospital, Inc., Elizabeth City, N. C.

NURSE ANESTHETIST, Male or Female, for small suburban New Orleans Hospital. Will be required to take call on Surgical and Obstetrical Patients. Submit complete resume together with salary required and photograph to: Thos. L. Qualey, Administrator, Slidell Memorial Hospital, 1125 E. Hall Ave., Slidell, La.

NURSE ANESTHETIST — Female. 230 bed accredited Connecticut Hospital, to complete staff of 4 Physicians and 4 Nurse Anesthetists. Liberal vacation and sick leave policies. Prevailing salary. 1½ hrs. from New York City, lake resort area foothills Berkshires. Growing community of 70,000. Write Chief Anesthesiologist, Danbury Hospital, Danbury, Conn.

NURSE ANESTHETIST—Salary $5,200-$6,400 per year. 40 hours weekly. One easy night call every two weeks One easy weekend call every two months. Four weeks vacation annually. Member AANA required. Please state training and experience in first letter to Dr. John C. Snow, Massachusetts Eye & Ear Infirmary, Boston, Mass.

REGISTERED NURSE ANESTHETIST: 110 bed, fully approved, new General Hospital for Surgery only. Salary, $600 per month for well trained, experienced person. Other Anesthetists in well established department. Unusual Personnel Policies. Please send complete curriculum vitae to: Administrator, The Lynn Hospital, 2900 S. Fort St., Detroit 17, Mich.

NURSE ANESTHETIST needed for 115 bed hospital. Heidbrink Machines in use and types of Anesthesia are nitrous oxide, oxygen and Sodium Pentothal. Qualifications: graduation from an approved school of anesthesia, membership in AANA, ability to give endotracheal anesthesia. Salary $700 per month. 40 hour week, rotating call. No Obstetrical call. Write: Myrtle L. Cooper, R.N., Director of Nursing Service, Providence Hospital, 8th and L St., Anchorage, Alaska.

TWO ANESTHETISTS needed to complete a staff of seven. For information contact Chief Anesthetist, Baptist Hospital, Pensacola, Florida.

NURSE ANESTHETIST: 236 bed Community Hospital, near Cincinnati, Male or Female, recently enlarged facilities, increasing staff, good policies, salary open. Write Administrator, Fort Hamilton Hospital, Hamilton, Ohio.

NURSE ANESTHETIST. New 140 bed, air conditioned, approved General Hospital. College Town of 30,000 near Nashville. Pleasant work situation, fringe benefits, excellent remuneration. Contact Administrator, Memorial Hospital, Clarksville, Tenn.

WANTED: Registered Anesthetist. Salary open. Contact Administrator, Medical Center, Bogalusa, Louisiana. Phone: RE 2-7122.

STARTING SALARY $500 per month. One meal and laundry of uniforms. Residence available in Nurses Home. Anesthesia call every other week. Contact Roy H. Laird Memorial Hospital, Kilgore, Texas.

WANTED: NURSE ANESTHETIST—A.A.N.A. Member for modern accredited 100 bed hospital in Central Florida. Unusually pleasant working conditions. One hour drive from Gulf Beaches, liberal Personnel Policies. Write: Administrator, South Florida Baptist Hospital, Plant City, Fla.

WANTED: Nurse Anesthetist to join Anesthesiologists and Nurses. Apply: Personnel Office, Mercer Hospital, 446 Bellevue Ave., Trenton, N. J.

WANTED: Certified Registered Nurse Anesthetist for new 65 bed Hill-Burton Hospital to open in April, 1961. For further information contact George R. Hart, Administrator, Memorial Hospital of Washington County, P. O. Box 181, Sandersville, Ga.

NURSE ANESTHETIST: for 175 bed accredited General Hospital Western Illinois. Morning surgical schedule, rotate call and weekends among four, little night work. One month vacation annually, accumulative sick leave. Minimum starting salary $6,000. For further information write to Chief Anesthetist, H. L. Aberg, Cottage Hospital, Galesburg, Illinois.

REGISTERED NURSE ANESTHETIST, starting salary open, based on experience, advances based on merit and tenure. Liberal Personnel Policies, including one of the better retirement plans. Successful candidate will report to Chief Anesthetist. Hospital, 268 beds and expanding, fully accredited, located in a good North Shore Community. Contact: Director of Personnel, Victory Memorial Hospital, Waukegan, Ill.

NURSE ANESTHETIST—Accredited 380 bed General Hospital. Modern air conditioned facilities. Department consists of a Head Nurse Anesthetist and 6 staff members. Call is evenly rotated every sixth night. Salary open depending upon experience. Liberal employee benefits. Apply: Miss Lucy Richards, Head Nurse Anesthetist, Lutheran Hospital, 2609 Franklin Blvd., Cleveland 13, Ohio.

NURSE ANESTHETISTS—Immediate openings for qualified Registered Nurses in 450 bed short term General Hospital with active Surgical Program. Opportunity to associate with three board certified Anesthesiologists. Salary commensurate with experience and training. Extra work available if interested. Write furnishing outline of experience to Director of Anesthesia, Delaware Hospital, 501 W. 14th St., Wilmington 99, Del.

WANTED: Three Nurse Anesthetists, Male or Female in a 500 bed General Hospital. Five day week—night call with compensation. Good Personnel Policies. Liberal benefits. Salary open. Contact Personnel Director, St. Mary's Hospital, 6420 Clayton Rd., St. Louis 17, Missouri.

NURSE ANESTHETISTS—For new 700 bed Teaching Hospital with modern Operating Room facilities; liberal Personnel Policies; group life, hospitalization, retirement benefits. Pleasant working conditions. Salary commensurate with training and experience. Residence accommodations available. Write to Personnel Director, Grady Memorial Hospital, 80 Butler St., S. E., Atlanta, Georgia.

WANTED: 2 Male Nurse Anesthetists with experience to join a private group of 3 M.D.'s, 6 Nurses (4 Male Nurses) covering 3 hospitals. Starting salary $650. mo. Insurance benefits, 3 weeks vacation, sick leave, rotation calls from home, no OB Anesthesia, average work week 25 hrs. Reply Box B-62, Journal American Association of Nurse Anesthetists, Prudential Plaza, Suite 3010, Chicago 1, Ill.

ANESTHETISTS: Immediate openings in a chain of ten General Hospitals located in the coal mining communities of Eastern Kentucky, Southwestern Virginia, and Southern West Virginia. Salary at the rate of $5,880 or 6,420 per annum, depending upon background and experience, annual increments. 4 weeks paid vacation, 7 paid holidays, sick leave, non-contributory retirement plan plus Social Security. WRITE TO: MINERS MEMORIAL HOSPITAL ASSOCIATION, Box 61, Williamson, West Virginia.

NURSE ANESTHETISTS: Two (2) required, salary up to $700 per month, depending on experience. New fifty bed hospital, liberal Personnel Policy. Apply Administrator, Dearborn County Hospital, 600 Wilson Creek Rd., Lawrenceburg, Ind., or phone Collect, 1010.

MALE NURSE ANESTHETIST with family, desires position for occupancy June 1st. Prefer small or medium size community; work with 2nd Anesthetist; Parochial School. Reply: Box B-47, Journal American Association of Nurse Anesthetists, Prudential Plaza, Suite 3010, Chicago 1, Ill.

Legislation

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nesota) clearly indicate that a private hospital, although it is not an insurer of the safety of a patient, must exercise such reasonable care for the protection and well-being of the patient as his known physical and mental condition requires or as is required by his condition as it ought to be known to the hospital in the exercise of ordinary care. [3] The duty imposed on the hospital in the instant case extends to safeguarding the patient from dangers due to the patient's physical and mental incapacity as indicated upon his entry and as could thereafter reasonably be anticipated in his case due to the progressive deteriorating effect resulting from the repeated shock treatments.

The court erred in directing a verdict and in not hearing the evidence on both sides and submitting the case to the jury. For that reason the decision in favor of the hospital was reversed and a new trial granted.

(Benedictine Sisters Hospital Ass'n., C-Quick v. 102 N.W. 2d, 36—Minn.)

The THIRTY-THIRD QUALIFYING EXAMINATION for membership in the American Association of Nurse Anesthetists will be conducted on May 13, 1961. The deadline for accepting completed applications including the transcripts is April 1. Notice of eligibility will be mailed about April 10.

Applications should be forwarded early enough to allow time to request transcripts and have them returned to the Executive Office before the deadline date.

Johnson

(Continued from page 32)

the value of correctly stated suggestions and, as a corollary, points out how often poorly expressed ideas and actions can add to the burdens of a patient by adding to his fears and apprehension and enhance his expectation and experience of pain and disability. Used within the limitations of application to our anesthesia practice, hypnosis should lead to very few unfavorable reactions but as in the mastery of any technique, practice helps us to recognize pitfalls of unacceptable or emotionally upsetting suggestions and helps us achieve more promising results.

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Vandam

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